Figure 4-1: Conceptual Site Plan of No-action Alternative

Source: Renard Development Company (2015)

The No-action Alternative would be developed with 1,860,000 SF of office space, 1,400,000 SF of retail space, 800 residential units, and two hotels totaling 550 rooms. While the proposed development may or may not end up in final form as shown in figure 4-1, the final arrangement and design of buildings and other improvements would be built over several stages and reflect a "cohesive development capable of sustaining an independent environment of continuing quality and stability" (M-NCPPC 2014b). A network of streets would support the mid-high density development clustered around the Metro station. The development would link to outside development via Greenbelt Metro Drive, an east-west oriented roadway connecting with Cherrywood Lane, a proposed north-south oriented roadway that would connect the North Core to Greenbelt Road (MD Route 193) to the south, and new access ramps to the Capital Beltway.

Although the proposed development has only received conceptual site plan approval, and further details would be developed during the detailed site plan approval process, the following information is known about the proposed pedestrian and bicycle environment (M-NCPPC 2014b):

- The pedestrian system would be convenient and comprehensively designed to encourage pedestrian activity within the development and to mass transit. High-quality urban design and amenities such as landscaping, street furniture, and lighting would be implemented in pedestrian areas.
- Pedestrian crossings would be provided at all intersections along the North-South Connector road, unless waived by the appropriate agency.
- Bicycle lanes would be provided on the North-South Connector road that connects the North and South Core areas.
- A north-south pedestrian/bike trail would be constructed that would make a direct connection between the North and South Core areas and would connect the Greenbelt Metro Station to the South Core area.
- An east-west trail connection between Cherrywood Lane and the North-South Connector road would be made.

Transit trips associated with amount of development proposed in the No-Action Alternative were calculated based on Prince George's County guidelines and the county agreed non-single occupancy vehicle (SOV) credit between 10 and 45 percent for these developments. The non-SOV trips were further disaggregated into bus trips and Metrorail trips using bus and subway proportions from the 2009-2013 *American Community Survey* (U.S. Census Bureau 2009-2013) means of transportation data for the census tract containing the study area. In total, the No-action Alternative would result in 621 additional AM peak hour Metrorail trips, 1,131 additional PM peak hour Metrorail trips, 92 additional AM peak hour bus trips, and 168 additional PM peak hour bus trips.

Parking is proposed in several garages in the North Core area, including a parking garage to replace the current WMATA surface parking for Greenbelt Metro Station users. On-street parking may also be part of the future development; if so, exact locations would be determined during the detailed site plan review process. While the total number of parking spaces is not yet known, the development would be required to provide adequate parking for all portions of the development as determined by M-NCPPC requirements (M-NCPPC 2014b).

All proposed transportation facilities to be provided either by the county or the developer would be adequate to carry the anticipated traffic for the proposed development. Total development between the North and South Core areas would generate no more than 4,030 AM peak hour vehicle trips and 6,879 PM peak hour vehicle trips (M-NCPPC 2014b). The remainder of the analysis in this chapter considers the No-build Condition for the reasons cited above.

4.2 No-build Condition Improvements

The following sections describe the No-build Condition improvements located within the Greenbelt study area including the planned developments and planned roadway improvements.

4.2.1 Planned Developments

Based on the Greenbelt Site Transportation Agreement (Appendix C1), four planned developments are included as part of the No-build Condition. These developments range from a small, 46,000 SF office development to a 450,000 SF office/retail, 800-unit residential, and 300-room hotel mixed-use development. The planned developments are located west of Cherrywood Lane between Greenbelt Road and I-95/I-495 as well as along Cherrywood Lane east of I-95/I-495.

The developments include the following:

North Core (Greenbelt Station Development) composed of 350,000 SF office, 100,000 SF retail, 800 units of apartments, and a 300-room hotel planned to replace the western side of the existing Greenbelt Metro station parking/ bus loops, Kiss & Ride area. The primary access would be from the planned Greenbelt Station Parkway.

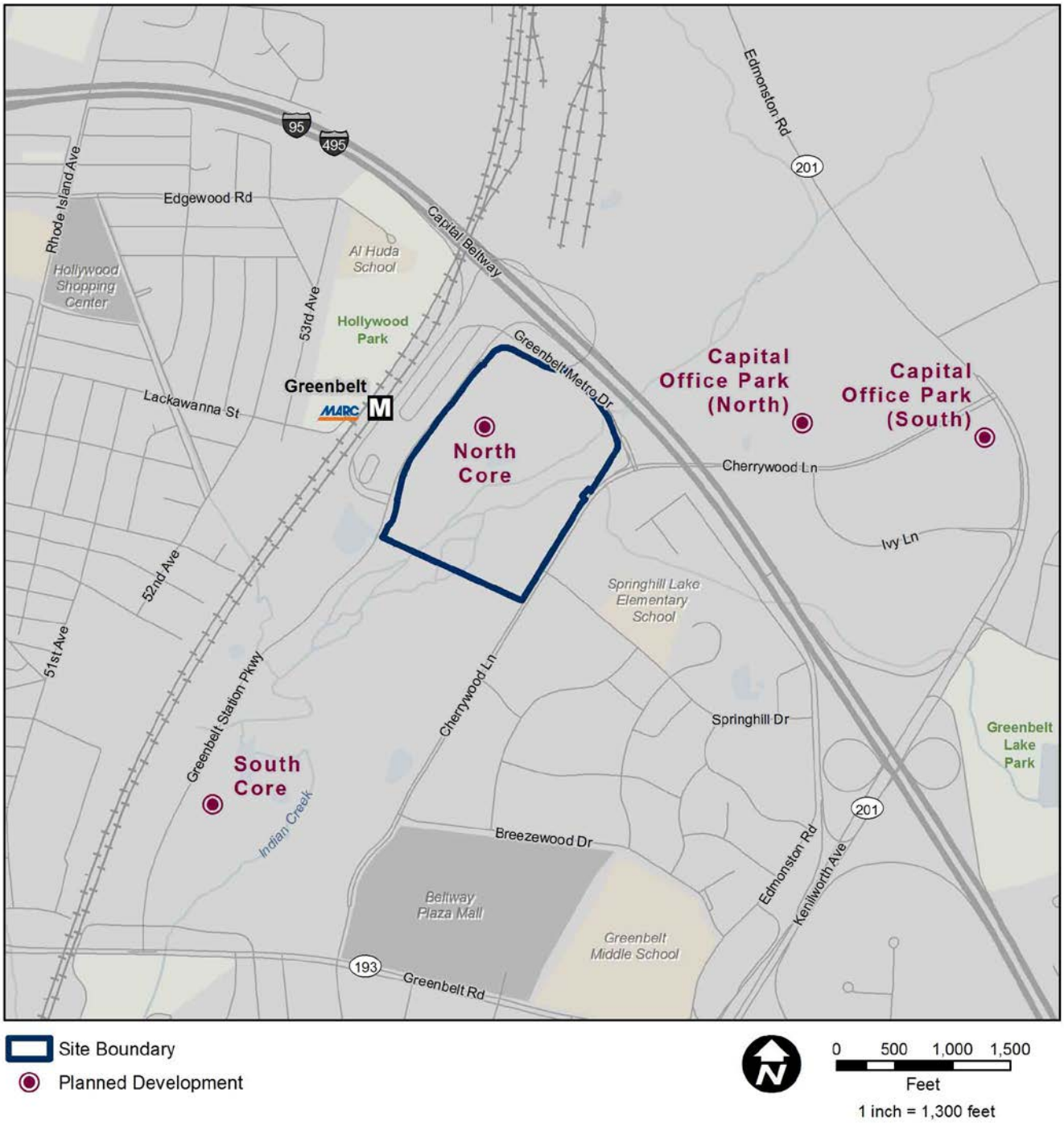
South Core (Greenbelt Station Development) composed of 180,120 SF retail, 550 units of apartments, and 350 units of townhouses located between the existing Greenbelt Metro station parking area and Greenbelt Road. The primary access would be from the planned Greenbelt Station Parkway.

Capital Office Park (North of Cherrywood Lane) composed of 300,000 SF office located north of Cherrywood Lane east of I-95/I-495. The primary access to the development would be from the Cherrywood Lane at Ivy Lane intersection.

Capital Office Park (South of Cherrywood Lane) composed of 46,000 SF office located south of Cherrywood Lane east of I-95/I-495 near the southwest corner of the Kenilworth Avenue/Edmonston Road at Cherrywood Lane intersection. The primary access to the development would be from Cherrywood Lane.

Figure 4-2 shows the Greenbelt No-build Condition planned development locations. All of the following information on these planned developments was gathered through a meeting with M-NCPPC (Masog 2014).

Figure 4-2: Greenbelt No-build Condition Planned Development Locations



4.2.2 Planned Roadway Improvements:

There are a number of planned roadway improvements scheduled to be constructed by the project horizon year (2022), including a new roadway system serving the Greenbelt Metro Station and the planned development

between the station and Greenbelt Road and a new set of ramps connecting the station area to I-95/I-495 south. All of these improvements are part of the planned North Core and South Core developments (M-NCPPC 2005). Specific improvements were provided by Maryland SHA (ramps serving the Interstate) and Renard Development Company, LLC (roadway network connecting the proposed land use to the Interstate ramps and adjacent roadways). The roadways planned to serve the North and South Core developments are as follows:

A. Greenbelt Station Parkway would be a north-south oriented roadway connecting Greenbelt Road (MD 193) to Greenbelt Metro Drive. The road would consist of a divided roadway served by two or four lanes in the northbound direction and two lanes in the southbound direction through the North Core area. It would operate as a divided roadway with one lane in each direction with several roundabouts through the South Core area and provide a spine roadway connecting the North and South Core development areas. It would also connect to the planned WMATA parking garage and the planned or revised Interstate ramps serving I-95/I-495.

B. Greenbelt Metro Drive is an east-west oriented roadway that would be realigned from its current path to connect to Greenbelt Station Parkway. It would primarily operate as a two-lane undivided roadway and continue to provide a connection between Cherrywood Lane and Greenbelt Station.

C. I-95/I-495 Off-ramps would follow a similar alignment as the existing off-ramp and would directly connect to the WMATA garage, the Kiss & Ride area, and Greenbelt Station Parkway. A new two-lane flyover ramp would be constructed between I-95/I-495 northbound and connect to the existing I-95/I-495 southbound off-ramp ramp.

D. I-95/I-495 Southbound On-ramp would originate at the proposed Greenbelt Station Parkway and Greenbelt Metro Drive intersection and connect to I-95/I495 southbound. It would begin as a two-lane ramp and reduce to one lane before merging onto the Interstate.

E. I-95/I-495 Northbound On-ramp would originate immediately south of the proposed Greenbelt Station Parkway and Greenbelt Metro Drive intersection and follow a horseshoe curve flying over Greenbelt Metro Drive and I-95/I-495 connecting to the existing on-ramp. It would begin as a two-lane ramp and reduce to one lane before merging onto the Interstate.

The new system of roadways would create seven new intersections through the North Core area, two roundabouts through the South Core area, and a new intersection along Greenbelt Road (MD 193). These intersections would be as follows:

F. Greenbelt Road (MD 193) and Greenbelt Station Parkway would include a new, 350-foot eastbound double left-turn lane and a new 150-foot westbound right-turn lane. The Greenbelt Station Parkway southbound approach would be composed of three lanes, two left-turn lanes (far left lane would be 225 feet) and a 225-foot right-turn lane. There would continue to be three through lanes for both directions of Greenbelt Road.

G. Greenbelt Station Parkway and Residential Access to 300 Units would include a two-lane northbound approach (Greenbelt Station Parkway) with one shared left-turn/through lane and one through lane, a two-lane southbound approach (Greenbelt Station Parkway) with one through lane (originating from the WMATA garage) and a shared through/right-turn lane, and a one-lane eastbound approach (residential Access to 300 Units) serving all moves. This intersection would be unsignalized with a STOP sign placed on the eastbound approach.

H. Greenbelt Station Parkway and WMATA Garage would include a two-lane northbound approach (Greenbelt Station Parkway) with one shared left-turn/through lane and one shared through/right-turn lane, a two-lane southbound approach (Greenbelt Station Parkway) with one through lane and one right-turn lane, and a two-lane eastbound approach (WMATA Garage) with one 150-foot left-turn lane and one right-turn lane. This intersection would be signalized.

I. Greenbelt Station Parkway and I-95/I-495 Off-ramp/Kiss & Ride area/Site South Access would include four approaches and a fifth departing segment. The northbound approach (Greenbelt Station Parkway) would have three lanes, one 375-foot left-turn lane and two through lanes. Two through lanes would originate from the WMATA garage along a parallel northbound approach immediately to the right of Greenbelt Station Parkway. The southbound approach (Greenbelt Station Parkway) would have a 400-foot left-turn/U-turn lane, one through lane, and one shared through/right-turn lane. The eastbound approach (I-95/I-495 Off-ramp) would have one left-turn lane, one shared left-turn/through lane, and one shared through/right-turn lane. The southeast approach (Kiss & Ride area) would have one lane serving all moves. There would also be three lanes departing the intersection to the east serving the Greenbelt site. This intersection would be signalized.

J. Greenbelt Station Parkway and Residential Access to 500 Units would include a two-lane southbound approach (Greenbelt Station Parkway) with one through lane and a shared through/right-turn lane, and a one-lane eastbound approach (Residential Access to 500 Units) serving right-turns only. This intersection would be unsignalized with a STOP sign placed on the eastbound approach.

K. Greenbelt Station Parkway and North Core Development/Site Northwest Access would include a four-lane northbound approach (Greenbelt Station Parkway) with one left-turn lane, two through lanes and one shared through/right-turn lane, a two-lane southbound approach (Greenbelt Station Parkway) with one through lane and one shared through/right-turn lane, and a three-lane eastbound approach (North Core Development) with two left-turn lanes and one right-turn lane. This intersection would be signalized.

L. Greenbelt Station Parkway and Greenbelt Metro Drive/Bus Loop would include a four-lane northbound approach (Greenbelt Station Parkway) with a 250-foot left-turn lane, two through lanes and one right-turn lane, a two-lane eastbound approach (Bus Loop) with one left-turn/through lane and one right-turn lane, and a three-lane westbound approach (Greenbelt Metro Drive) with one left-turn/U-turn lane, one through lane and one right-turn lane. This intersection would be signalized.

M. Greenbelt Metro Drive and Site North Access would be an intersection for use with the Build Condition, but was included as part of the design provided by Renard Development Company, LLC. The design includes three lanes for the northbound approach from the Greenbelt Site. For the eastbound approach, one lane would serve all moves, and the westbound approach would include a 150-foot left-turn lane and a through lane.

Figure 4-3 shows the No-build Condition planned roadway improvements. See figure 4-4 for the No-build Condition intersection map and figure 4-5 for the updated lane geometry of the study area intersections. In figure 4-5, the new or changed lane movements are shown in red.

Figure 4-3: No-build Condition Greenbelt Planned Roadway Improvements

Figure 4-4: No-build Condition Intersection Map

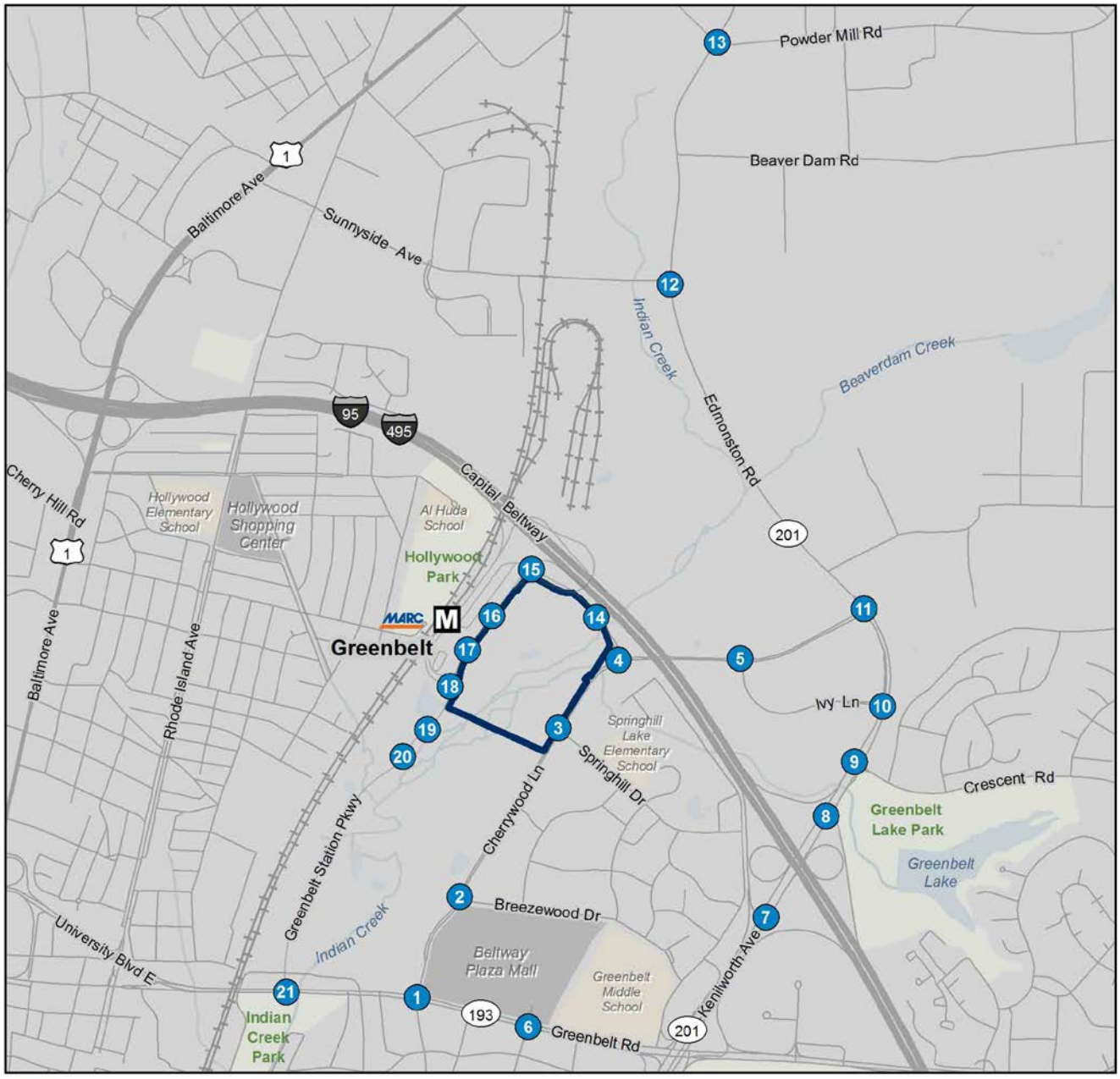
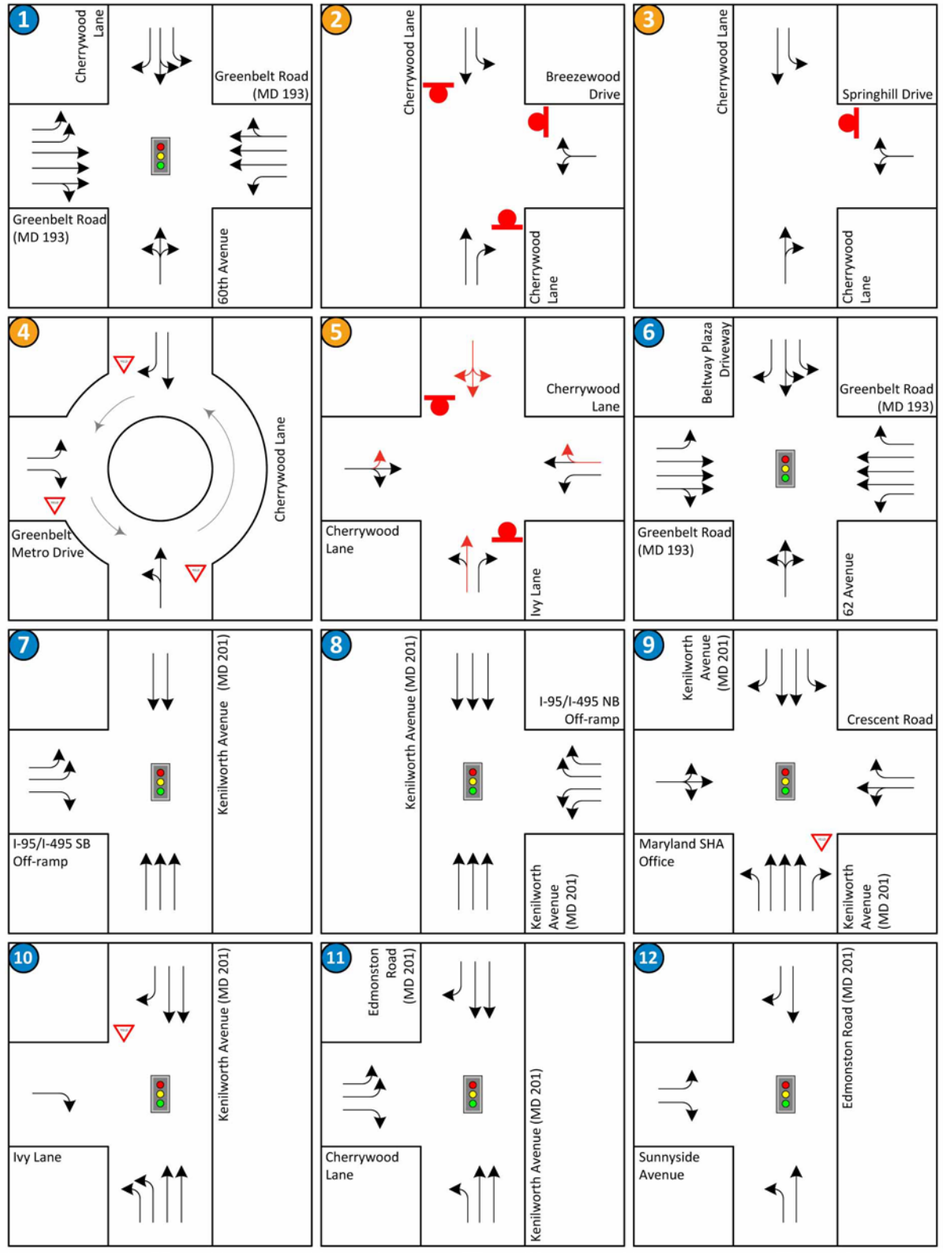


Figure 4-5: No-build Condition Lane Geometry



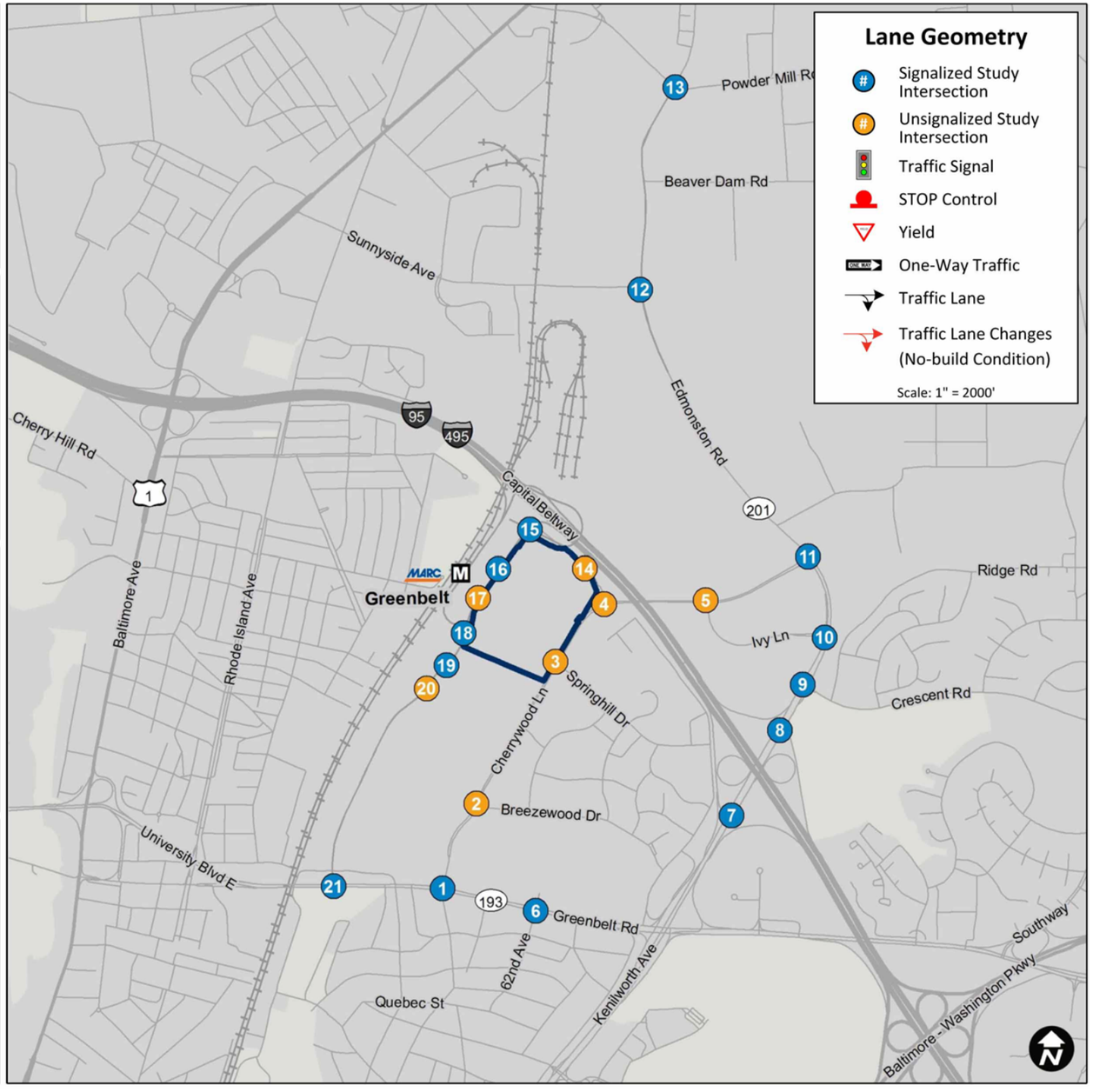
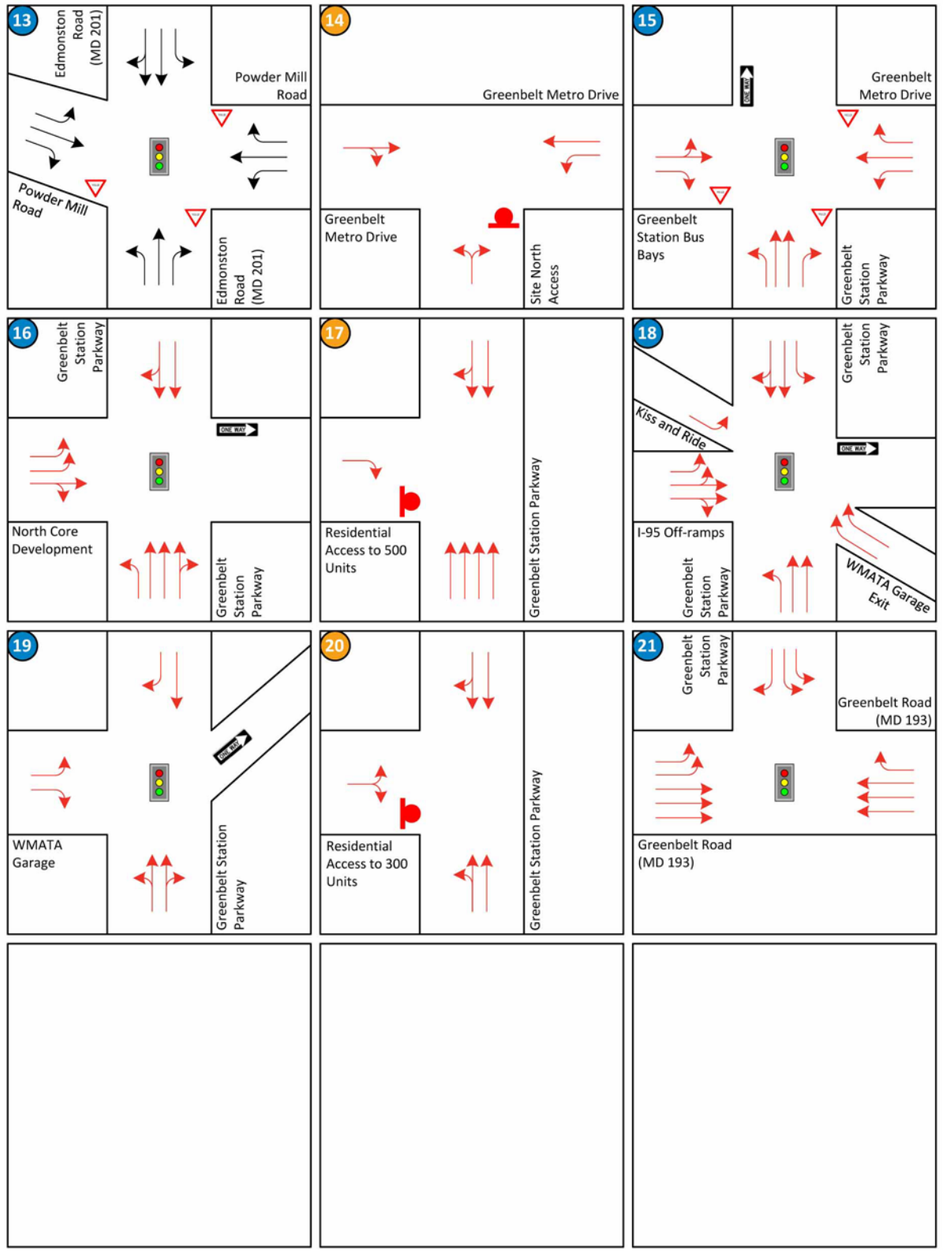


Figure 4-5: No-build Condition Lane Geometry (continued)



4.3 Pedestrian Network

While the exact design and layout of the pedestrian network is not finalized, the No-build Condition pedestrian system would be convenient and comprehensively designed to encourage pedestrian activity within the development and to mass transit (M-NCPPC 2014b). Pedestrian areas and public spaces would have high-quality urban design and amenities such as landscaping, street furniture, and lighting. Pedestrian crossings would be provided at all intersections along Greenbelt Station Parkway, the North-South connector road between the North and South Core development areas, unless waived by the appropriate agency. In addition, an east-west trail connection between Cherrywood Lane and Greenbelt Station Parkway and a north-south pedestrian/bike trail would be constructed; the latter would provide a direct connection between the North and South Core areas and connect the Greenbelt Metro Station to the South Core area. A direct pedestrian connection is also proposed from the Greenbelt Metro Station to the office development planned on the east side of the roadway; this connection would provide more direct access for pedestrians and increase safety by creating special attention to pedestrian crossings at-grade. All of these improvements may not be complete by 2022 because the development would be staged, but significant improvements to the pedestrian environment at and around the site are planned with the Greenbelt Station project development.

Additionally, according to the Maryland Department of Transportation (DOT)/SHA's 2015-2020 Transportation Improvement Program (TIP) (MDOT with Maryland SHA 2014), several regional and Prince George's County funding categories include funds for sidewalk, signing, lighting, pedestrian crossing, safety improvements, ADA improvements or retrofits, and/or traffic management improvements to benefit pedestrians. Specific details are not available about what projects would receive these funds, but areas within the non-vehicular study area could receive improvements as a result.

With the development proposed with the Greenbelt Station project (North and South Cores) and annual transit growth, the amount of pedestrian traffic in the area would increase. The improvements planned with Greenbelt Station, however, should accommodate any increases in pedestrians and improve the overall pedestrian environment around the site. Under the No-build Condition, depending on the amount of development implemented for the Greenbelt Station project, impacts to pedestrians would be indirect, long-term, and beneficial. The planned pedestrian improvements would have a beneficial impact by creating spaces specifically designed for pedestrians and to improve pedestrian safety. The proposed Greenbelt Station improvements would also increase the overall walkability and pedestrian connections in the area around the site.

4.4 Bicycle Network

The Prince George's County Bicycle Master Plan (included in the *Approved Countywide Master Plan of Transportation* [M-NCPPC 2009]) recommends several bicycle facilities within the Greenbelt study area (see table 4-2 and figure 4-6). Overall, two new multi-use paths, one bicycle lane, and four bicycle routes are recommended. Bicycle routes are roadways with signed bicycle route designations or shared lane arrow pavement markings (sharrows), but not actual marked bicycle lanes. Directly adjacent to the proposed site, the plan recommends a multi-use path along Indian Creek, connecting to Greenbelt Road and Cherrywood Lane. There is no dated implementation plan included in the Master Plan, and therefore, it is not clear whether any of these recommendations would be implemented by 2022. Therefore, these improvements are shown as "proposed" in both table 4-2 and figure 4-6.

In addition to the planned county improvements, the developer of the Greenbelt Station project has committed to construct several bicycle features in the North Core area around the site (M-NCPPC 2014). These improvements include bicycle lanes along Greenbelt Station Parkway, a north-south pedestrian/bike trail providing a connection between the North and South Cores and the Metrorail station, and an east-west trail connection between Cherrywood Lane and Greenbelt Station Parkway, at this point assumed to be along Greenbelt Metro Drive

(figure 4-6). Since Greenbelt Station Parkway and at least some portions of Greenbelt Metro Drive are assumed to be constructed or reconstructed as part of the No-build Condition, in order to have a comparable road network to the Build Condition, it is assumed that the bicycle facilities adjacent to these roadways would also be completed at that time. Therefore, the Greenbelt Station Parkway bicycle lane and the Greenbelt Metro Drive mixed-use path would be constructed, or existing, as part of the No-build Condition. However, all of these improvements may not be complete by 2022 because the development will be staged.

Therefore, the No-build Condition would have indirect, long-term, beneficial impacts to bicycle conditions in the study area due to added bicycle features that are proposed as part of the North Core development. If additional planned bicycle facilities are implemented in the study area, the beneficial impact to the bicycle network would improve beyond the beneficial impacts noted here.

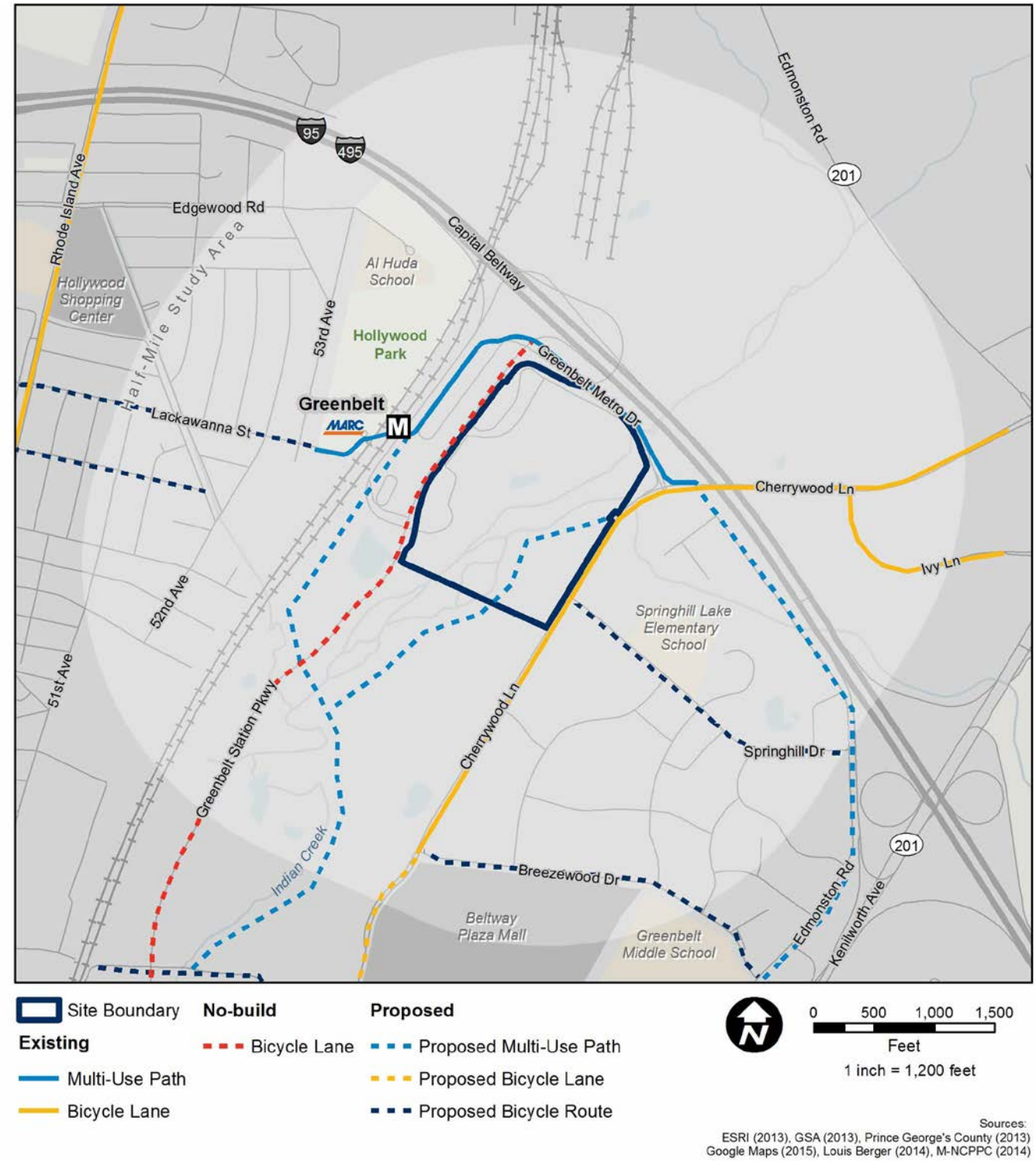
Table 4-2: Proposed Bicycle Facilities in the Greenbelt Study Area

Roadway	From/To	Type	Future Status	Notes
Indian Creek	Greenbelt Road to Greenbelt Metro Station/Cherrywood Lane	Multi-Use Path	Proposed	Adjacent to site; similar alignment also proposed as part of the North Core development
Edmonston Road	Cherrywood Lane to Greenbelt Road	Multi-Use Path	Proposed	-
Cherrywood Lane	Breezewood Drive to Greenbelt Road	Bicycle Lane	Proposed	-
Breezewood Drive	Cherrywood Lane to Edmonston Road	Bicycle Route	Proposed	-
Springhill Drive	Cherrywood Lane to Edmonston Road	Bicycle Route	Proposed	-
Lackawanna Street	U.S. Route 1 to 53rd Avenue	Bicycle Route	Proposed	-
Hollywood Road	U.S. Route 1 to Narragansett Parkway	Bicycle Route	Proposed	-
Greenbelt Station Parkway	Greenbelt Road (MD 193) to Greenbelt Metro Drive	Bicycle Lane	No-build Condition	Proposed as part of the North Core development
Greenbelt Metro Drive [a]	Greenbelt Station Parkway to Cherrywood Lane	Multi-Use Path	No-build Condition	Proposed as part of the North Core development

[a] Although Greenbelt Metro Drive already has a multi-use path, with redevelopment of the North Core it is assumed at least a portion of this roadway and the associated mixed-use path would be reconstructed.

Source: M-NCPPC (2009); M-NCPPC (2014b)

Figure 4-6: Proposed Greenbelt Area Bicycle Facilities



4.5 Public Transit

The following sections describe the No-build Condition for the bus and Metrorail modes within the Greenbelt study area. Commuter rail, commuter bus, carsharing, slugging, and private shuttles are not evaluated for the No-build Condition because future ridership information or planning documents were not available.

4.5.1 Projected Transit Growth

Growth in the transit mode was calculated for the year 2022 using regional transit growth rates and projected ridership associated with large planned developments in proximity to the site.

Regional transit growth rates were obtained using the Metropolitan Washington Council of Governments (MWCOG) Version 2.3.57 Regional Travel Demand Model (MWCOG 2015), which projects an annual growth rate of 2.1 percent between 2008 and 2025 on the Metrorail system and 1.9 percent on the region's bus network (including Metrobus). The Metrorail growth rate was applied to ridership at Greenbelt Metrorail station, while the bus growth rate was applied to Metrobus ridership in the study area.

There are several planned projects located in proximity to the Greenbelt site with associated transit trips, including the North Core and South Core developments. Transit trips associated with these developments were calculated based on ITE trip generation rates and the transit mode split determined in the Greenbelt Site Transportation Agreement (Appendix C1). Prince George's County agreed to a non- SOV credit between 10 and 45 percent for these developments (see *Trip Generation* in Section 4.8, *Traffic Analysis*, for more details). The non-SOV trips were further disaggregated into bus trips and Metrorail trips using bus and subway proportions from the 2009-2013 *American Community Survey* (U.S. Census Bureau 2009-2013) means of transportation data for the census tract containing the study area. The resulting bus and Metrorail trips were added to the projected background growth.

4.5.2 Metrorail Analysis

The Metrorail analysis was conducted using projected ridership growth in the system at the Greenbelt Metro Station and ridership projected for planned development projects in the study area.

4.5.2.1 Ridership Growth from Planned Projects

As previously mentioned, additional transit trips associated with the North Core and South Core developments were added to future projected ridership at the Greenbelt Metro Station. The peak hour non-SOV trips associated with the developments (see Section 4.5.1 *Projected Transit Growth*) were disaggregated (divided) into peak hour Metrorail trips using the subway proportion from the 2009-2013 *American Community survey* (U.S. Census Bureau 2009-2013) means of transportation data for the census tract containing the development. The *American Community Survey* is an on-going annual sampling of demographic data across the United States conducted by the U.S. Census Bureau. The peak hour Metrorail passenger trips were then disaggregated into peak AM and PM 15-minute totals using the current AM and PM peak hour factors (PHF) at the station (WMATA 2014g). A PHF is the proportion of peak hour ridership that occurs during the peak 15-minute period in that hour. The additional Metrorail trips associated with the North Core and South Core development are summarized in table 4-3. AM peak 15-minute ridership is used in the station platform and fare vending capacity analysis. PM peak 15-minute ridership is used in the station vertical and faregate aisle capacity analysis, the passenger load analysis, and the emergency evacuation (NFPA 130) analysis. Each represents the peak use, as described below.

Table 4-3: Projected Trips Associated with Planned Development Projects

Period	Total Non-SOV Trips Per Hour			Metrorail Proportion of Non-SOV	Metrorail Passenger Trips Per Hour			Peak Hour Factor	Metrorail Passenger Trips Per 15-Minute		
	IN	OUT	TOTAL		Exits	Entries	Total		Exits	Entries	Total
AM Peak	262	240	502	47.58%	125	114	239	27.72%	35	32	66
PM Peak	300	330	630	47.58%	143	157	300	28.02%	40	44	84

Source: WMATA (2014e)

4.5.2.2 Regional Transit Growth Rate

Background ridership growth at Greenbelt Metro Station for 2022 was calculated based on the 2.1 percent Metrorail growth rate from the MWCOG travel demand model. Table 4-4 summarizes projected 2022 weekday entries at the station, including background growth and growth from planned projects. Average weekday exits would theoretically be the same or similar to average weekday entries.

Table 4-4: Weekday No-build 2022 Projected Metrorail Ridership at Greenbelt Metro Station

Metro Station	Average Weekday Entries			
	2014	2022 with Background Growth	2022 Planned Development Projects	2022 Total No-build
Greenbelt	6,098	7,185	271	7,456

Source: Greenbelt Site Transportation Agreement (Appendix C1); WMATA (2014e); MWCOG (2015)

4.5.2.3 Metrorail Passenger Loads

Metrorail passenger loads in each study area were calculated based on projected ridership at Greenbelt Metro Station. Because Greenbelt is a terminal station, passenger loads are equal to the total number of exiting passengers per train in the outbound direction (trains ending at the station) or the total number of entering passengers per train in the inbound direction (trains beginning at the station). Outbound exiting passengers during the PM peak period were higher than inbound entering passengers during the AM peak period at the station, and therefore PM peak 15-minute exits were used for this analysis. Projected ridership was calculated using the trips associated with the planned projects and the regional Metrorail growth rate.

No expansion of WMATA's current Metrorail fleet was assumed for this analysis to provide the most conservative estimate of potential capacity issues. WMATA's Momentum Plan, the agency's vision for the future including near-term goals for 2025, does call for all eight-car trains on all lines during peak periods by the year 2020; however, this would require significant upgrades to electrical systems and a significant expansion of WMATA's current fleet of railcars (WMATA 2014g).

All trains were assumed to have six cars, also to provide the most conservative estimates of passenger loads per car. WMATA has three thresholds for railcar occupancy: less than 100 passengers per car (acceptable), between 100 and 120 passengers per car (crowded), and greater than 120 passenger per car (extremely crowded). Capacity is generally considered to be 120 passengers per car. Projected passenger loads by 2022 are below 100 passengers per car, and therefore would be considered acceptable. Table 4-5 summarizes passenger loads per car in 2022 under the No-build Condition using PM 15-minute exits.

Table 4-5: Projected Maximum Metrorail No-build Condition Passenger Loads at Greenbelt Metro Station

Measure (PM Peak 15-Minute Exits)	Unit
2014 Maximum 15-Minute Passengers	361
2022 Passengers with Background Growth	426
2022 Passengers with Development Projects	32
2022 Total No-build Passengers	458
2022 Minimum Trains [a]	3
2022 Train Cars [b]	18
2022 Maximum No-build Passengers Per Car	**25**

[a] A 4-minute headway equates to 3.75 trains every 15 minutes. This figure was rounded down to 3 minutes to provide the most conservative load estimate.
[b] Assuming three 6-car trains at Greenbelt.
Source: WMATA (2014e); MWCOG (2015)

4.5.2.4 Station Capacity Analysis

A capacity analysis was conducted for the vertical elements (escalators and stairs), faregate aisles, fare vending machines, and platform at the Greenbelt Metro Station. The analysis used peak 15-minute periods of ridership (entries and exits) at the station according to projected 2022 No-build Condition ridership. No-build Condition 2022 ridership includes planned development trips at the station and projected regional transit growth of 2.1 percent per year.

Volume-to-capacity (v/c) ratios were calculated for the vertical elements and fare elements, and pedestrian LOS was calculated for the platform area. Analysis for vertical elements and faregate aisles used projected ridership from the peak exiting period at the station – the time period when the highest total number of passengers would use each element. Table 4-6 summarizes ridership growth during the peak exiting periods at the station.

Table 4-6: Weekday Peak 15-Minute Exiting Period Ridership Growth

Metro Station	Time	2014		2022 No-build	
		Entries	Exits	Entries	Exits
Greenbelt	5:00 PM – 5:15 PM	55	353	109	456

Source: WMATA (2014e); MWCOG (2015)

The platform area analysis and fare vending analysis used projected ridership from the peak entering period at the station – the time period when the most passengers would likely use fare vending machines and the highest number of passengers would be waiting on the platform. Table 4-7 summarizes ridership growth during the peak entering period at Greenbelt Metro Station.

Table 4-7: Weekday Peak 15-Minute Entering Period Ridership Growth

Metro Station	Time	2014		2022 No-build	
		Entries	Exits	Entries	Exits
Greenbelt	7:15 AM – 7:30 AM	361	36	458	77

Source: WMATA (2014e); MWCOG (2015)

Table 4-8 summarizes the results of the Greenbelt Metro Station capacity analysis, including the vertical elements, fare elements, and platform. Overall, vertical elements (escalators and stairs), faregate aisles, and fare vending machines at Greenbelt Metro Station are projected to operate within capacity, or below a v/c of 0.7, which is considered capacity. Additionally, platform peak pedestrian LOS (based on the available spacing between passengers) on the busiest platform sections are projected to be at the acceptable LOS B. Further details on the station capacity analysis are found in Appendix C3.

Table 4-8: 2022 No-build Greenbelt Metro Station Capacity Analysis Summary

Element		Volume to Capacity (V/C) Ratio
Mezzanine/ Platform	Entry Escalators	0.04
	Exit Escalators	-
	Stairs	0.53
Faregate Aisles		0.20
Fare Vending		0.14
Platform Peak LOS		B

Source: WMATA (2014e); Station Site Inventories conducted in January 2015 by FourSquare (subconsultant).

4.5.2.5 NFPA 130 Emergency Evacuation Analysis

An emergency evacuation analysis was conducted to compare the evacuation capacity of Greenbelt Metro Station to standards set by the NFPA 130 code (TRB 2013). NFPA 130 requires that station platforms be fully evacuated with 4 minutes and that all passengers reach a "point of safety" within 6 minutes. WMATA Metrorail stations, however, are not required to meet these criteria. Details on the assumptions and calculations necessitated in NFPA 130 are found in Appendix C4. A summary of the emergency evacuation analyses is included below, with further details on the analysis included in Appendix C4.

The NFPA 130 analysis used the projected number of entries and exits from the peak 15-minute period (5:00 PM to 5:15 PM) at Greenbelt Metro Station. The previous Table 4-6 summarizes the volume of passengers entering and exiting the station during this period.

Using the peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the platform at Greenbelt Metro Station could be evacuated in 1.7 minutes, and the entire station could be evacuated to a point of safety within 3.7 minutes.

4.5.3 Metrobus Analysis

As a part of the North Core and South Core planned developments, six additional AM peak hour bus trips and eight additional PM peak hour bus trips are planned to be added to existing bus services within the study area (see *Trip Generation* in Section 4.8 *Traffic Analysis* for more details). This would result in an additional passenger capacity of 256 passengers during the AM peak hour and 336 passengers during the PM peak hour. The overall analysis was limited to Metrobus service because no ridership data were available for TheBus, and the Central Maryland RTA G Route only serves Greenbelt Metro Station on weekends. It can be assumed, however, that TheBus would see some minor increases in ridership on routes that serve the site.

To calculate peak hour bus volumes within each study area, the 2014 maximum weekday passenger loads for each route and direction at stops within the study area were averaged by stop; this figure was then multiplied by the number of peak trips per hour to calculate ridership per peak hour by route and direction. These totals were

grown to the year 2022 using the 1.9 percent annual regional growth rate for the bus mode. The 2022 totals were then summed to calculate a total ridership per peak hour for the study area.

The peak hour non-SOV trips associated with the North Core and South Core developments (see Section 4.5.1, *Projected Transit Growth*) were disaggregated into peak hour bus passenger trips using the bus mode proportion from the 2009-2013 *American Community Survey* (U.S. Census Bureau 2009-2013) means of transportation data for the census tract containing the development. This additional ridership, approximately 35 AM peak hour passengers and 44 PM peak hour passengers (see table 4-9), was then added to each route and direction proportionally based on existing ridership.

Table 4-9: Projected Bus Passenger Trips Associated with Greenbelt North Core and South Core Developments

Period	Total Non-SOV Trips Per Hour			Bus Proportion of Non-SOV	Bus Passenger Trips Per Hour		
	IN	OUT	TOTAL		IN	OUT	TOTAL
AM Peak	262	240	502	7.06%	18	17	35
PM Peak	300	330	630	7.06%	21	23	44

Note: Values may not appear to calculate correctly due to rounding.
Source: Greenbelt Site Transportation Agreement (Appendix C1); U.S. Census Bureau (2009-2013)

To calculate the peak hour capacity of bus services within the study area, the capacity per trip of each bus route during the peak hour was multiplied by the number of trips scheduled in the peak hour. Capacities per trip for each Metrobus route were based on the typical number of seats available on each trip and the WMATA load standard (WMATA 2013c). The additional capacity associated with the six additional AM peak hour and eight additional PM peak hour bus trips planned with the North Core and South Core developments was then added to the overall study area capacity (Renard Development Company 2014). This was done by adding additional bus trips per peak hour to the route/directions with the most severe capacity issues (Routes 87 north, 87 south, 89 north, 89 south, 89M south, C2 east, G13 west, R11 north, and R12 south; see the Metrobus Capacity Analysis Appendix C6 for more details).

Total 2014 peak hour bus ridership (Existing Condition) and projected 2022 peak hour bus ridership (No-build Condition) are summarized in table 4-10. The 2014 and No-build 2022 bus ridership are below the calculated capacity of current and future projected bus services in the study area, meaning the additional passenger trips projected can be adequately handled by current service levels.

Table 4-10: Current and Projected Bus Ridership in the Greenbelt Study Area

Measure	2014		2022 Background Growth		2022 Planned Development Projects		2022 Total No-build	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Total Volume	671	654	778	758	35	44	813	803
Total Capacity	1,337	1,273	1,337	1,273	256	336	1,593	1,609
Volume to Capacity Ratio (V/C)	0.50	0.51	0.58	0.60	-	-	0.51	0.50

Sources: WMATA (2014g); MWCOG (2015); Greenbelt Site Trip Generation Summary

Even though the study area as a whole would not be over capacity, several individual routes are projected to have capacity issues, including Routes 87, 89, and 89M. However, the capacity issues on these routes would be alleviated with the addition of the planned bus trips associated with the North Core and South Core developments (Renard Development Company 2014). Additionally, WMATA has completed studies of Routes 87, 89, 89M, and C2. Certain recommendations from these studies have already been implemented, and are all intended to help alleviate overcrowding on these routes. Further analysis would be required to determine the extent to which the recommendations would impact capacity on these routes. Appendix C6 has further details on the Metrobus capacity analysis.

4.5.4 Greenbelt Metro Station Bus Bays

Currently, the Greenbelt Metrorail station bus loop has a total of 11 bus bays, three of which are unoccupied and one of which is used by the intercity bus company, Bolt Bus. Excluding Bolt Bus (which has a schedule that varies), a total of 23 buses per hour serve the station bus loop. WMATA standards call for a maximum of six buses per hour per bay (WMATA 2008). The maximum acceptable capacity (based on a 2-minute loading/unloading time and a 3-minute layover time), however, is 12 buses per hour (WMATA 2013b). With 10 bus bays usable by local buses, the current capacity of the bus loop is 60 buses per hour, well above its current use. The North Core and South Core development projects would add six buses during the AM peak hour and eight buses during the PM peak hour to this total, resulting in a maximum of 31 buses per hour serving the bus loop. Therefore, the current bus bay supply would be sufficient to handle the additional bus service to be implemented under the No-build Condition. Table 4-11 summarizes the Greenbelt station No-build Condition bus loop capacity analysis.

Table 4-11: Greenbelt Metro Station No-build Condition Bus Loop Capacity Analysis

Year/Condition	Buses Per Hour	Bus Bays	Standard Capacity (Buses Per Hour)	Maximum Acceptable Capacity (Buses Per Hour)
2014 Existing	23	10 [a]	60	120
2022 No-build	29 AM, 31 PM	10 [a]	60	120

[a] This does not include one additional bus bay used by Bolt Bus.
Source: WMATA (2008); (2013b); (2014d)

4.5.5 Level of Impact

The increase in public transit trips in the No-build Condition would have the following impacts on transit:

- Several Metrobus Routes (87, 89, and 89M) would continue to have capacity issues due to their capacity issues present in Existing Condition. The additional bus service planned with the North Core and South Core developments would mitigate capacity issues on these three routes. The overall capacity of bus services in the study area would accommodate the projected ridership.
- Metrorail passenger loads through the study area are projected to be at acceptable levels.
- Metrorail vertical elements are projected to operate below capacity.
- Metrorail faregate aisles and fare vending machines would continue to operate below capacity.
- Metrorail platform peak pedestrian LOS (based on the available spacing between passengers) on the busiest platform sections are projected to continue to be at the acceptable LOS B.

- Platform and station evacuation times would increase slightly over existing conditions, but would continue to meet NFPA 130 standards. WMATA Metrorail stations, however, are not required to meet NFPA 130 standards.

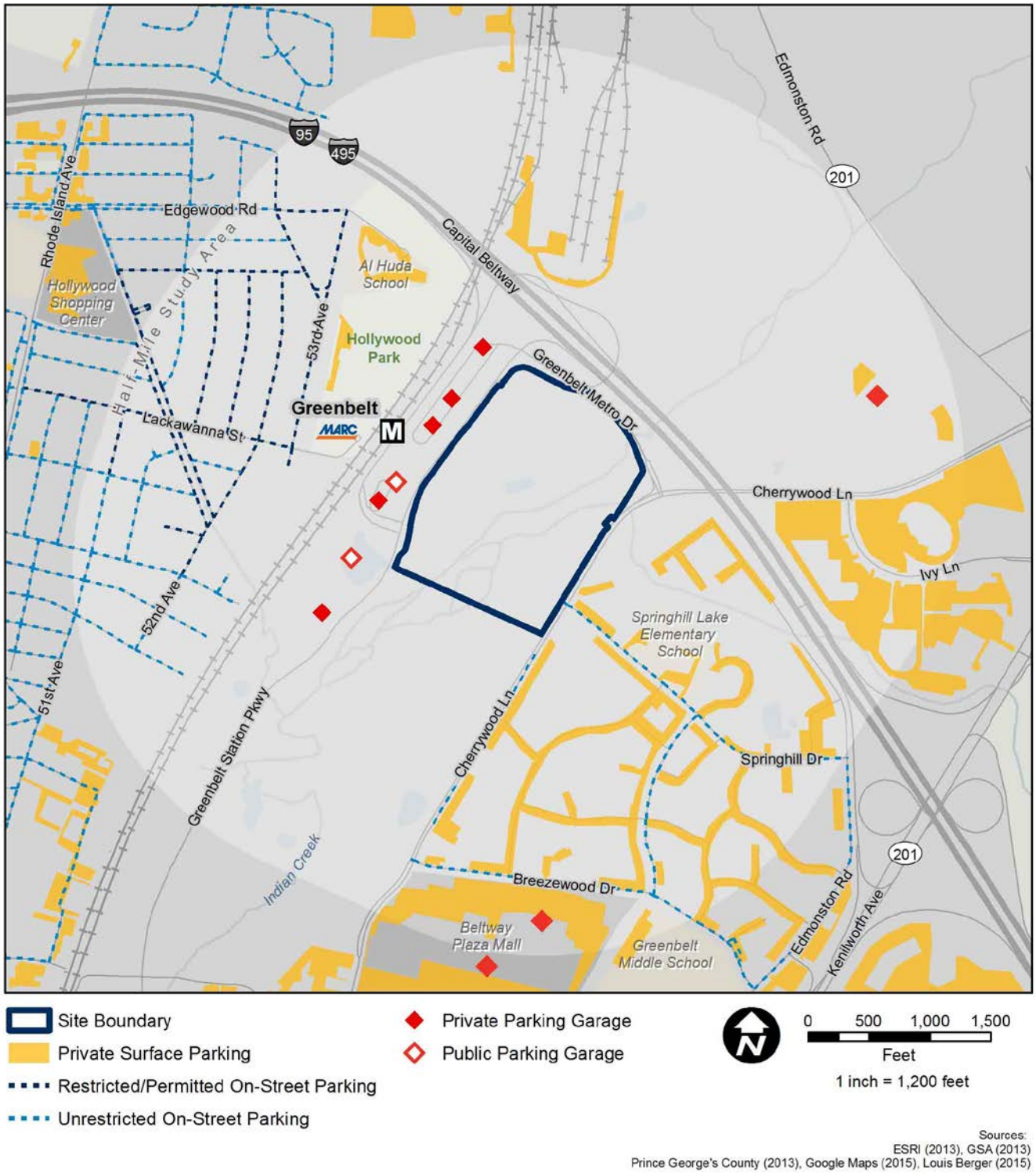
Therefore, the No-build Condition would have no measurable indirect, long-term impacts to public transit capacity. In addition, bus operation delays (three bus routes) would have indirect, long-term, major adverse impacts caused by the potential traffic delays forecasted along Edmonston Road (see Section 4.8, *Traffic Analysis*).

4.6 Parking

Parking is proposed in several garages in the North Core area, including a parking garage to replace the current WMATA surface parking for Greenbelt Metro Station users. According to documents submitted by developers for the consolidated FBI HQ site selection process, there would be approximately 4,200 parking spaces in the new Greenbelt Metro Station garage. It is anticipated that this number of spaces would accommodate demand, since it is a substantial increase from the current number of parking spaces at the Metrorail station. On-street parking may also be part of the future development; if so, exact locations would be determined during the detailed site plan review process. Parking as currently proposed for the No-build Condition would be as shown in figure 4-7. While the total number of parking spaces for the Greenbelt Station project is not yet known, the development will be required to provide adequate parking for all portions of the development as determined by M-NCPPC requirements (M-NCPPC 2014b).

With the proposed North Core parking, there will be an increase of both public (paid) and private garage parking just west of the Greenbelt site, between the site and the Greenbelt Metro Station. The increase in parking will accommodate the new development; therefore the No-build Condition will have an indirect, long-term, beneficial impact to parking by increasing the overall supply in the area. While the additional parking will bring additional vehicular traffic to the study area, the roads have been designed to adequately handle the increase in traffic.

Figure 4-7: No-build Condition Parking



4.7 Truck Access

Truck access routes would use the new roadway and access points determined through the detailed site plan process with Prince George's County and M-NCPPC. The roadways and access points would be designed to

safely and adequately provide truck access to the No-build development. Therefore, there would be no measurable indirect, long-term impacts to truck access.

4.8 Traffic Analysis

The No-build Condition includes various programmed transportation improvements in the study area, growth in existing traffic volumes through the same horizon year as the Build Condition or 2022, and trips generated by approved and unbuilt development projects. It also includes adding planned roadway improvements to the Existing Condition, growth in the trips to and from the Greenbelt Metro Station, and shifts in vehicle trips based on the planned roadway improvements. Volumes are then used as an input, along with delay, signal timing, and geometrics, to evaluate traffic operations and queuing at signalized and unsignalized intersections, and on freeways, to determine the impacts of traffic growth and potential mitigation measures.

Based on the Greenbelt Site Transportation Agreement (Appendix C1), the future forecasts relied on two primary sources, Maryland SHA and M-NCPPC, which provided the background growth rates, planned roadway improvements, and approved list of planned developments.

The following section describes the process for analyzing traffic for the No-build Condition and the results of the analysis. Note that the procedures to forecast future traffic volumes throughout the TIA include rounding; therefore, values may not add up to the precise value indicated.

4.8.1 Background Growth

Background growth was added to the Interstate and non-Interstate roadway network to account for vehicle trips traveling through the study area during the AM and PM peak hours. These trips are important to include because they account for vehicle volume growth due to land use changes outside of the study area. Two sources were relied on to develop background growth rates. The MWCOG Travel Demand Model and the AADT volumes maintained by Maryland SHA. The MWCOG travel demand forecasts, in close collaboration with local jurisdictions, provide consolidated, consistent future vehicle volume projections that support air quality modeling, traffic congestion forecasts, and general planning. The models are updated regularly as conditions change, but there is always some degree of lag. The AADT volumes provide a historic reference. M-NCPPC recommends six years of historic data to determine a historical average growth.

Based on comparison between the 2010 and 2025 MWCOG travel forecast model (Version 2.3.52 adopted in 2013 – latest version available for this study), there was an average growth of 0.6 percent per year on Kenilworth Avenue/Edmonston Road (MD 201), 0.5 percent annual growth on Cherrywood Lane, and a zero percent annual growth for Greenbelt Road (MWCOG 2014a). According to Maryland SHA's maintained average annual daily traffic (AADT) volumes between 2008 and 2013, there was a negative trend for all area roadways. As agreed in the Greenbelt Site Transportation Agreement, a 0.33 annual growth rate was selected for all non-Interstate roadways, excluding the newly planned roadways serving the North Core, South Core, and Greenbelt Metro Station (Greenbelt Site Transportation Agreement, Appendix C1). These excluded roadways had a separate growth process that would result in double counting if the background growth rate were included.

For the Interstate roadway network, the same versions of the MWCOG travel demand model (Version 2.3.52) (MWCOG 2014a) were compared, and sample daily traffic volumes were extracted from the MWCOG model for I-95 northbound and southbound between the Baltimore Washington Parkway and U.S. Route 1 interchange. Higher growth percentages were calculated between Kenilworth Avenue and the Greenbelt Metro Station in the northbound direction, while lower growth rates were calculated near the U.S. Route 1 and Baltimore Washington Parkway interchanges in the eastbound direction. Based on the model data, the average annual growth was 0.45 percent. Based upon the Greenbelt Site Transportation Agreement, a 0.33 percent annual growth was used for

the Interstate roadways to reflect the next third of a percent lower than the average and to also avoid potential double counting of the increase in vehicles through the Greenbelt Metro Station intersection, a location where future growth would be specifically calculated as part of this study. The map illustrating the No-build Condition background growth in the study area is found in Appendix C7.

4.8.2 Development of Existing Vehicle Volumes through Proposed North and South Core Roadway Network

The next consideration within the No-build Condition analysis involved modeling the redistribution of vehicle volume in conjunction with the planned roadway improvements The process of populating the proposed North Core and South Core roadways with the existing Greenbelt Metro Station vehicle volumes (WMATA-based trips) required several steps. The WMATA-based trips were first extended through the proposed roadways. The percentage shift in WMATA-based trips to and from I-95/I-495 South was then calculated. Lastly, the WMATA-based trips were shifted.

4.8.2.1 Extension of Existing WMATA-based Trips

The first step involved using the existing volumes obtained for the ramps between the station and I-95/I-495 and the roundabout serving Greenbelt Metro Drive to extend through the network based on the percentage breakdown for the three destinations (parking, dropping off at the Kiss & Ride or using the bus loop). Specifically, these included the WMATA garage for Metro parking trips, the bus loop for bus trips, and the Kiss & Ride for existing Kiss & Ride trips. The destination was determined based on adjusting the existing counts serving all parts of the Greenbelt Metro Station obtained through the *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study* (Renard Development Company 2014). These existing counts were based on the peak hour of the station and not the peak hour of the study area roads and Interstate. The adjusted volumes represent the volumes during the same time period as the study peak hour. The station peak hour reflects the higher commuter volumes that arrive by vehicle earlier than the study area peak and depart by vehicle later then the study area peak because of the added travel time for these commuters to travel by Metrorail between the Greenbelt Metro Station and their employment destination in addition to remaining at their place of employment for a full day. Tables 4-12 and 4-13 show the AM and PM peak hour volumes respectively, before and after the adjustment. Figure 4-8 shows the existing volumes extended through the North Core and South Core proposed roadways, including s the detailed turning movement AM and PM peak volumes pertaining to the extension of WMATA-based trips.

Table 4-12: AM Peak Hour Volume Adjustment from Station Peak Hour to Study Area Peak Hour

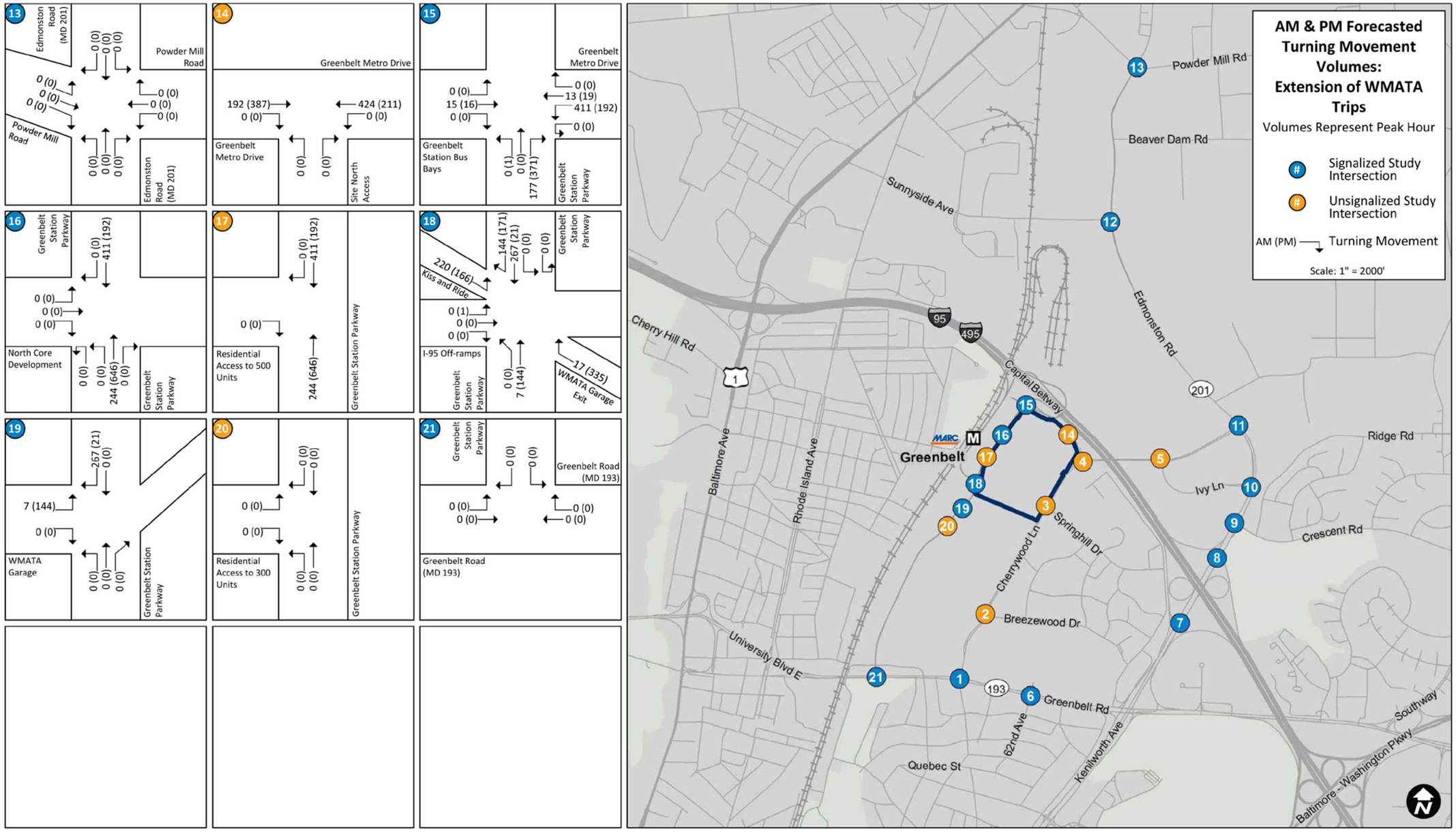
Destinations /Origins	Inbound from I-95/I-495			Outbound to I-95/I-495		
	Existing Volumes (Station peak hour)	Percentage	Existing Volumes (Study area peak hour)	Existing Volumes (Station peak hour)	Percentage	Existing Volumes (Study area peak hour)
Parking Area	430	91	381	7	11	7
Kiss & Ride Area	41	9	38	55	89	60
Bus Loop	0	0	0	0	0	0
Total	471	100	419	62	100	67
Destinations /Origins	**Inbound from Cherrywood Lane**			**Outbound to Cherrywood Lane**		
	Existing Volumes (Station peak hour)	Percentage	Existing Volumes (Study are peak hour)	Existing Volumes (Station peak hour)	Percentage	Existing Volumes (Study are peak hour)
Parking Area	417	63	267	23	8	15
Kiss & Ride Area	226	34	144	208	83	160
Bus Loop	21	3	13	21	8	15
Total	664	100	424	252	100	192

Table 4-13: PM Peak Hour Volume Adjustment from Station Peak Hour to Study Area Peak Hour

Destinations /Origins	Inbound from I-95/I-495			Outbound to I-95/I-495		
	Existing Volumes (Station peak hour)	Percentage	Existing Volumes (Study area peak hour)	Existing Volumes (Station peak hour)	Percentage	Existing Volumes (Study area peak hour)
Parking Area	32	48	30	492	93	255
Kiss & Ride Area	33	50	32	36	7	19
Bus Loop	1	2	1	0	0	0
Total	66	100	63	528	100	274
Destinations /Origins	**Inbound from Cherrywood Lane**			**Outbound to Cherrywood Lane**		
	Existing Volumes (Station peak hour)	Percentage	Existing Volumes (Study are peak hour)	Existing Volumes (Station peak hour)	Percentage	Existing Volumes (Study are peak hour)
Parking Area	26	10	21	347	58	224
Kiss & Ride Area	209	81	171	232	38	147
Bus Loop	22	9	19	22	4	16
Total	257	100	211	601	100	387

Figure 4-8: No-build AM and PM Existing Volumes Extended through the North Core and South Core Proposed Roadways

Figure 4-8: No-build AM and PM Existing Volumes Extended through the North Core and South Core Proposed Roadways (continued)



4.8.2.2 Percentage Shift in WMATA-based Trips

Once the existing volumes were adjusted to the peak hour of the study area, the vehicle volumes required a shift based on the opening of the proposed interchange ramps. The new ramps would create a quicker route for vehicles to and from I-95/I-495 South compared to the existing route via Kenilworth Avenue and Cherrywood Lane. Based on the existing condition volumes between the I-95/I-495 northbound off-ramp to Kenilworth Avenue and Cherrywood Lane and Greenbelt Metro Drive roundabout, the percentage of vehicles following the route were extracted. This process started at the off-ramp volume, or 807 vehicles, and tracked them through the five intersections leading to Greenbelt Metro Drive. At each intersection, the percentages for each vehicle movement were calculated, and the percentage representing travel in the appropriate direction leading to Greenbelt Metro Drive was applied. For example, the next intersection north of the I-95/I-495 off-ramp along Kenilworth Avenue is Crescent Road, which had 89.2 percent of the vehicles heading north on Kenilworth Avenue. Therefore, the 807 was multiplied by the 89.2 percent to arrive at 720 vehicles out of the 807 vehicles continuing north on Kenilworth. This process was followed to Cherrywood Lane, where the remaining number of vehicles was assumed to be destined to Greenbelt Metro Drive. It was assumed that all vehicle trips turning left from Ivy Lane to Cherrywood Lane during the AM peak hour were destined to Greenbelt Metro Drive. It was assumed that all vehicle trips turning left from Ivy Lane to Cherrywood Lane during the PM peak hour were not destined to Greenbelt Metro Drive.

The reverse from Greenbelt Metro Drive followed a similar process except all vehicles turning right from Cherrywood Lane onto Ivy Lane would continue to Kenilworth Avenue southbound. It was also assumed that all vehicles from Greenbelt Metro Drive reaching Kenilworth Avenue southbound would be destined to I-95/I-495 South.

Based on this process, approximately 50 percent of vehicles turning from Cherrywood Road westbound to Greenbelt Metro Drive or vehicles turning from Greenbelt Metro Drive to Cherrywood Drive would represent vehicles that would shift their travel pattern from Kenilworth Avenue and Cherrywood Lane to the new ramps serving Greenbelt Metro Station. Tables 4-14 and 4-15 contain the inbound and outbound I-95/I-495 South to Greenbelt Metro Drive travel pattern summaries, respectively.

Table 4-14: I-95/I-495 South to Greenbelt Metro Drive Travel Pattern Summary (Inbound)

	Volume from Off-Ramp	Movement Percent	Movement Direction	Volume from Ivy Lane	Movement Direction
AM Peak Hour					
Kenilworth Avenue and I-95/I-495 Ramp	807	100%	Right		
Kenilworth Avenue and Crescent Road	720	89.2%	Through		
Kenilworth Avenue and Ivy Lane	539	74.8%	Through		
Kenilworth Avenue and Cherrywood Lane	124	23.1%	Left		
Cherrywood Lane and Ivy Lane	124	100%	Through	51	Left
Cherrywood Lane and Greenbelt Metro Drive	124	100%	Right	51	Right
Volume Traveling from I-95/I-495 to Greenbelt Metro Drive				124+51=175	
Total Volume from Cherrywood Lane Westbound to Greenbelt Metro Drive				312	
Percent of Total Volume from Cherrywood Lane Westbound to Greenbelt Metro Drive originating from I-95/I-495				56.1% or ~50%	
PM Peak Hour					
Kenilworth Avenue and I-95/I-495 Ramp	506	100%	Right		
Kenilworth Avenue and Crescent Road	423	83.5%	Through		
Kenilworth Avenue and Ivy Lane	377	89.1%	Through		
Kenilworth Avenue and Cherrywood Lane	58	15.5%	Left		
Cherrywood Lane and Ivy Lane	58	100%	Through	0	Left
Cherrywood Lane and Greenbelt Metro Drive	58	100%	Right	0	Right
Volume Traveling from I-95/I-495 to Greenbelt Metro Drive				58	
Total Volume from Cherrywood Lane Westbound to Greenbelt Metro Drive				119	
Percent of Total Volume from Cherrywood Lane Westbound to Greenbelt Metro Drive originating from I-95/I-495				48.7% or ~50%	

Table 4-15: Greenbelt Metro Drive to I-95/I-495 South Travel Pattern Summary (Outbound)

	Volume from Greenbelt Metro Drive	Movement Percent	Movement Direction	Volume to/from Ivy Lane	Movement Direction
AM Peak Hour					
Cherrywood Lane and Greenbelt Metro Drive	116	100%	Left		
Cherrywood Lane and Ivy Lane	75	65%	Through	41	Right
Kenilworth Avenue and Cherrywood Lane	23	30.5%	Right		
Kenilworth Avenue and Ivy Lane	23	100%	Through		Right
Kenilworth Avenue and Crescent Road	64	91.5%	Through	Added back to Greenbelt Metro Drive Volume	
Kenilworth Avenue and I-95/I-495 Ramp	59	100%	Through		
Volume Traveling from Greenbelt Metro Drive to I-95/I-495 South				59	
Total Volume from Greenbelt Metro Drive to Cherrywood Lane				116	
Percent of Total Volume from Greenbelt Metro Drive to Cherrywood Lane Eastbound destined to I-95/I-495 South				50.9% or ~50%	
PM Peak Hour					
Cherrywood Lane and Greenbelt Metro Drive	261	100%	Right		
Cherrywood Lane and Ivy Lane	204	78.2%	Through	57	Right
Kenilworth Avenue and Cherrywood Lane	102	50%	Right		
Kenilworth Avenue and Ivy Lane	102	100%	Through		Right
Kenilworth Avenue and Crescent Road	159	100%	Through	Added back to Greenbelt Metro Drive Volume	
Kenilworth Avenue and I-95/I-495 Ramp	140	87.9%	Through		
Volume Traveling from Greenbelt Metro Drive to I-95/I-495 South				140	
Total Volume from Greenbelt Metro Drive to Cherrywood Lane				261	
Percent of Total Volume from Greenbelt Metro Drive to Cherrywood Lane Eastbound destined to I-95/I-495 South				53.6% or ~50%	

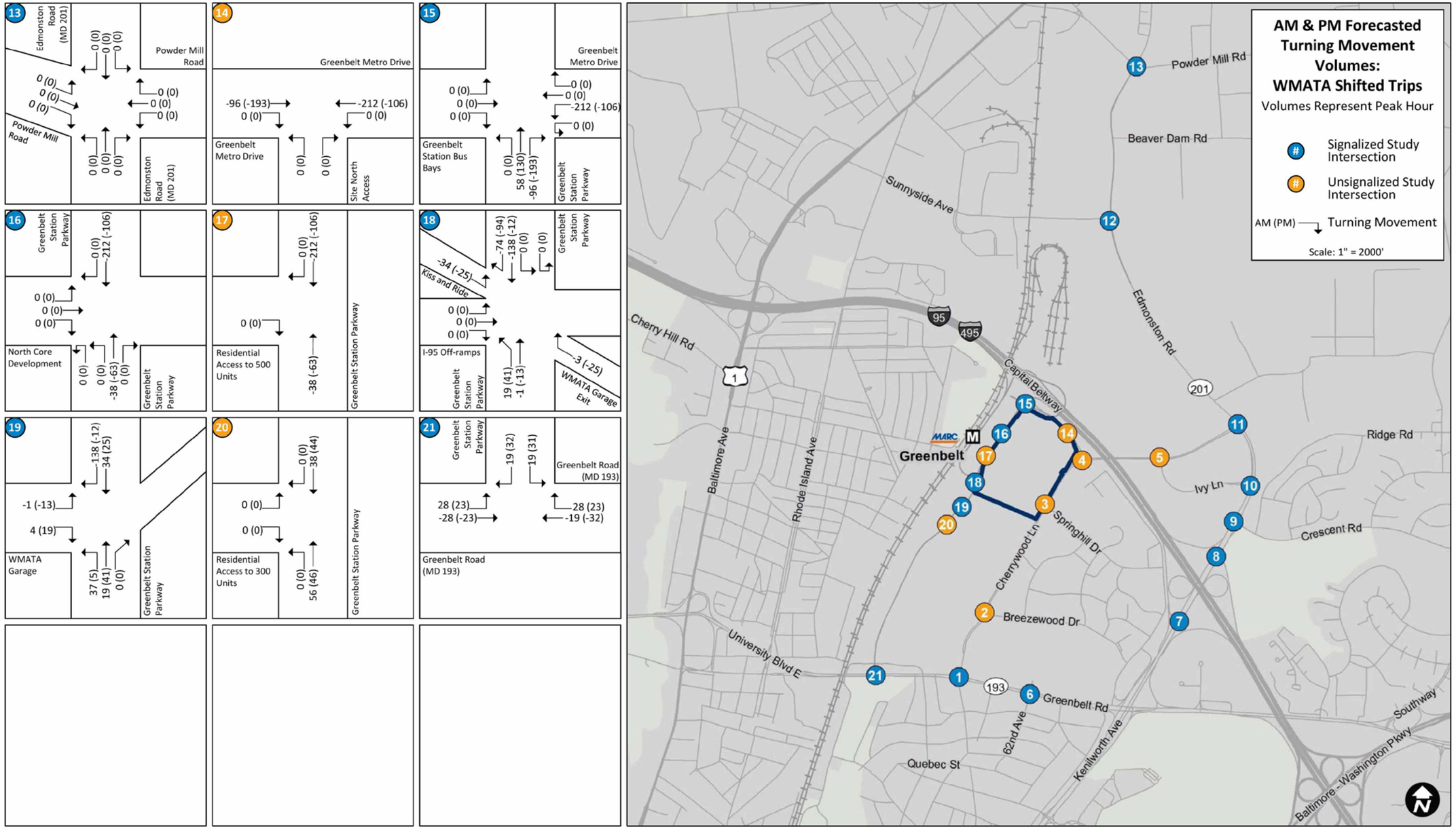
4.8.2.3 WMATA-Based Trips Shifted

The travel patterns demonstrated that approximately 50 percent of the existing volumes travel between Greenbelt Metro Drive and Cherrywood Road to and from the east. The existing volumes were shifted to match that pattern, representing the trips that would likely use the new I-95/I-495 Greenbelt ramps. This resulted in 214 vehicle trips being shifted from Kenilworth Avenue and Cherrywood Lane during the AM (156 inbound and 58 outbound) and 190 vehicle trips shifted from Kenilworth Avenue and Cherrywood Lane during the PM (60 inbound and 130 outbound). In addition, 50 percent of the vehicle volumes traveling between Greenbelt Metro Drive and

Cherrywood Lane to and from the west were shifted to Greenbelt Station Parkway through the South Core development based on the *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study* (Renard Development Company 2014). Figure 4-9 shows the AM and PM peak hour Greenbelt Metro Station shifted volumes.

Figure 4-9: AM and PM Peak Hour Greenbelt Metro Station Shifted Volumes

Figure 4-9: AM and PM Peak Hour Greenbelt Metro Station Shifted Volumes (continued)



4.8.3 Trip Generation/Modal Split

The process to add each development for the No-build Condition followed the M-NCPPC/Prince George's County guidelines by using the county's prescribed trip generation formulas (M-NCPPC 2012a). Depending on the type of development and size, the trip generation either relied on the Prince George's County trip rates or ITE trip rates. Prince George's County supplies trip rates for a number of typical land uses such as office and residential. Table 4-16 shows the trip generation rates used to cover the planned developments.

In addition to the planned developments, the WMATA-based trip growth and the forecasted cut-through traffic (traffic from adjacent areas both inside and outside the study area that would be expected to change their travel pattern to access I-95/I-495 using the new available roadway connections) was calculated.

Table 4-16: No-build Condition Trip Generation Rates

Land Use	Trip Generation Rate	Trips Entering	Trips Existing
General Office (Prince George's County Guidance)	AM Trips = 2.00 X units	90% inbound	10% outbound
	PM Trips = 1.85 X units	18.9% inbound	81.1% outbound
General Office (ITE - 710): Greater than 108,000 square feet	Ln(AM trips) = .80 Ln(units) + 1.57	90% inbound [a]	10% outbound [a]
	PM Trips = 1.12 X units + 78.45	18.9% inbound*	81.1% outbound*
Hotel (ITE - 310)	AM Trips = 0.53 X units	59% inbound	41% outbound
	PM Trips = 0.60 X units	51% inbound	49% outbound
Shopping Center (ITE - 820)	Ln(AM trips) = .61 Ln(units) + 2.24	62% inbound	38% outbound
	Ln(AM trips) = .67 Ln(units) + 3.31	48% inbound	52% outbound
Apartments (Prince George's County Guidance)	AM Trips = 0.52 X units	19% inbound	81% outbound
	PM Trips = 0.60 X units	65% inbound	35% outbound
Townhouses (Prince George's County Guidance)	AM Trips= 0.70 X units	20% inbound	80% outbound
	PM Trips = 0.80 X Units	65% inbound	35% outbound

[a] Follows Prince George's County distribution rates
Notes: Ln = Natural Log

4.8.3.1 Planned Development Trip Generation

After establishing the proper trip rate, the internal capture procedures outlined in National Cooperative Highway Research Program (NCHRP) 684 were followed to account for existing trips that would choose to walk between

nearby land uses rather than drive (TRB 2011). The NCHRP process relies on capture rates between specific land uses. This procedure is endorsed as the preferred procedure for handling internal capture by the ITE's *Proposed Trip Generation Handbook*, Third Edition (ITE 2014). Two planned developments required this procedure to reflect the mixed use. Appendix C8 contains the NCHRP 684 worksheets.

The M-NCPPC/Prince George's County guidelines were also followed in handling pass-by trips (M-NCPPC 2012a). These represent existing trips that include a stop at a retail use along their route and continue on their way following the stop. For example, a person may stop at the dry cleaners or take-out restaurant on their way home from work. According to the M-NCPPC/Prince George's County guidelines, the smaller the retail space, the higher the percentage of pass-by trips assigned. Two planned developments required this procedure.

M-NCPPC/Prince George's County procedures allow for a transit credit to be applied for developments within proximity of transit. A maximum of a 20 percent trip credit may be applied. This credit would be applied to the trip generation, thus reducing the forecasted vehicle trips and assigning them as transit trips. One site (South Core) is proposed to be located within 0.5 mile of the Greenbelt Metro Station; therefore, a 10 percent transit credit was applied to reflect the Metro transit access. The North Core development is planned to be situated next to the Metrorail station; therefore, the 2005 WMATA Ridership Survey was relied on instead of the M-NCPPC/Prince George's County procedures to provide the transit percentage by land use (WMATA 2006). The *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study* (Renard Development Company 2014) followed a similar process. Based on Table S-4 from the 2005 WMATA study, office had a 34 percent transit share, retail had a 37 percent transit share, residential had a 45 percent transit share, and hotel had a 31 percent transit share. These values represent the average transit share by land use.

4.8.3.2 WMATA-based Growth

In addition to the planned development trip generation, the future vehicle trip growth for the Greenbelt Metro Station was forecasted to 2022. The MWCOG travel demand model indicated a 2.07 annual growth rate for the Metrorail system. Based on the *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study*, a growth rate of 1.5 percent was used for vehicle trips destined to the proposed WMATA parking garage, along with that study's Kiss & Ride annual growth rate of 3 percent representing vehicles destined to the station's Kiss & Ride (Renard Development Company 2014). The annual growth rates were applied to the volume results from the shifted WMATA-based trips process covering the parking garage or the Kiss & Ride area. The percent split for future trips (between inbound and outbound) is assumed to be consistent with current trips.

Bus trips were also increased consistent with WMATA's request through the *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study*. Based on the study, the buses were grown at the same rate as the Kiss & Ride or 3.0 percent per year. Based on an 8-year growth, there was a total of four new buses during the AM peak hour and five new buses during the PM peak hour. Both values were adjusted to passenger car equivalents (1 bus equals 1.5 cars) for traffic modeling purposes (M-NCPPC 2012a). This resulted in 12 vehicles (6 entering and 6 departing) during the AM peak hour and 15 vehicles during the PM peak hour, eight entering and seven departing.

Table 4-17 presents the planned development and WMATA trip generation summary.

Table 4-17: Planned Development and WMATA Trip Generation Summary

PROJECT	UNITS/SIZE/ CREDITS	AM PEAK HOUR TRIPS			PM PEAK HOUR TRIPS		
		IN	OUT	TOTAL	IN	OUT	TOTAL
North Core (West side of Greenbelt Station Parkway)							
General Office (ITE - 710) [a]	350,000 square feet	469	52	521	89	381	470
Internal Capture Trips (following NCHRP 684 Tables)		-38	-15	-53	-13	-31	-44
Net External Trips		431	37	468	76	350	426
Transit Credit (following 2005 WMATA Ridership Survey) [b]	34% credit	-147	-13	-160	-26	-119	-145
Net External Vehicle Trips		284	24	308	50	231	281
Shopping Center (ITE - 820)	100,000 square feet	97	59	156	288	311	599
Internal Capture Trips (following NCHRP 684 Tables)		-22	-19	-41	-58	-103	-161
Net External Trips		75	40	115	230	208	438
Transit Credit (following 2005 WMATA Ridership Survey) [b]	37% credit	-28	-15	-43	-85	-77	-162
Net External Vehicle Trips		47	25	72	145	131	276
Pass-by Trips (reduction based on overall retail development)	20% pass-by	-9	-5	-14	-29	-26	-55
Net External Vehicle and Pass-by Trips		38	20	130	116	105	221
Apartments (Prince George's County Guidance)	800 units	79	337	416	312	168	480
Internal Capture Trips (following NCHRP 684 Tables)		-2	-10	-12	-88	-40	-128
Net External Trips		77	327	404	224	128	352
Transit Credit (following 2005 WMATA Ridership Survey) [b]	45% credit	-35	-147	-182	-101	-58	-159
Net External Vehicle Trips		42	180	222	123	70	193
Hotel (ITE - 310)	300 rooms	94	65	159	92	88	180
Internal Capture Trips (following NCHRP 684 Tables)		0	-18	-18	-21	-6	-27
Net External Trips		94	47	141	71	82	153
Transit Credit (following 2005 WMATA Ridership Survey) [b]	31% credit	-29	-15	-44	-22	-25	-47
Net External Vehicle Trips		65	32	97	49	57	106
TOTAL VEHICLE TRIPS		**429**	**256**	**685**	**338**	**463**	**801**

[a] Per Prince George's County Guidance ITE followed for developments exceeding 108,000 square feet

[b] 2005 WMATA Ridership Survey Table S-4

Table 4-17: Planned Development and WMATA Trip Generation Summary (continued)

PROJECT	UNITS/SIZE/ CREDITS	AM PEAK HOUR TRIPS			PM PEAK HOUR TRIPS		
		IN	OUT	TOTAL	IN	OUT	TOTAL
South Core							
Shopping Center (ITE - 820)	180,000 square feet	138	85	223	426	462	888
Internal Capture Trips (following NCHRP 684 Tables)		-4	-2	-6	-43	-120	-163
Net External Trips		134	83	217	383	342	725
Transit Credit (1/2 to 3/4 mile walk to Greenbelt Station) [c]	10% credit	-13	-8	-21	-38	-34	-72
Net External Vehicle Trips		121	75	196	345	308	653
Pass-by Trips	40% pass-by	-48	-30	-78	-138	-123	-261
Net External and Pass-by Trips		73	45	217	207	185	725
Apartments (Prince George's County Guidance)	550 units	54	232	286	215	115	330
Internal Capture Trips (following NCHRP 684 Tables)		-1	-2	-3	-65	-23	-88
Net External Trips		53	230	283	150	92	242
Transit Credit (1/2 to 3/4 mile walk to Greenbelt Station) [c]	10% credit	-5	-23	-28	-15	-9	-24
Net External Vehicle Trips		48	207	255	135	83	218
Townhouses (Prince George's County Guidance)	350 units	49	196	245	182	98	280
Internal Capture Trips (following NCHRP 684 Tables)		-1	-2	-3	-55	-20	-75
Net External Trips		48	194	242	127	78	205
Transit Credit (1/2 to 3/4 mile walk to Greenbelt Station) [c]	10% credit	-5	-19	-24	-13	-8	-21
Net External Vehicle Trips		43	175	218	114	70	184
TOTAL VEHICLE TRIPS		**164**	**427**	**591**	**456**	**338**	**794**
[c] MNCPPC approved 10% transit credit based on proximity to the Greenbelt Metro Station (50% of full 20% credit)							
Capital Office Park (North of Ivy Lane)							
General Office (ITE - 710)*	300,000 square feet	415	46	461	78	336	414
TOTAL VEHICLE TRIPS		**415**	**46**	**461**	**78**	**336**	**414**
[a] Per Prince George's County Guidance ITE followed for developments exceeding 108,000 square feet							
Capital Office Park (SW Corner of Cherrywood Lane and MD 201)							
General Office (Prince George's County Guidance)	46,000 square feet	83	9	92	16	69	85
TOTAL VEHICLE TRIPS		**83**	**9**	**92**	**16**	**69**	**85**
Greenbelt Station Kiss & Ride							
Kiss & Ride (passenger drop-off/pick-up)	3% annual growth	48	59	107	55	44	99
TOTAL VEHICLE TRIPS		**48**	**59**	**107**	**55**	**44**	**99**
Greenbelt Station Bus Service							
Local Bus Service	3% annual growth	6	6	12	8	7	15
TOTAL VEHICLE TRIPS		**6**	**6**	**12**	**8**	**7**	**15**
Greenbelt Station Parking Garage							
Metro Riders	1.5% annual growth	82	3	85	6	61	67
TOTAL VEHICLE TRIPS		**82**	**3**	**85**	**6**	**61**	**67**

4.8.3.3 *Cut-through Traffic*

In addition to the planned developments, the WMATA-based trip growth and the forecasted cut-through traffic (traffic from adjacent areas both inside and outside the study area that would be expected to change their travel pattern to access I-95/I-495 using the new available roadway connections) was calculated. The cut-through traffic would be a result of the connection provided by the new set of roadways between Greenbelt Road/Cherrywood Lane and I-95/I-495. These new connections would provide an alternative to using the existing U.S. Route 1 and Kenilworth Avenue interchanges to access I-95/I-495.

Based on the *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study*, M-NCPPC developed future forecasts through travel demand modeling to represent the condition in 2040 (Renard Development Company 2014). The model estimated 8,582 vehicles per day would use the new roadways as a cut-through. Because this volume represented the 2040 condition, the volumes were adjusted to represent 2022 by using a reverse compound formula with the Greenbelt Site Transportation Agreement approved background growth rate (0.33 percent). The result reduced the estimated volume from 8,582 to 8,088 vehicles per day ($8,582 / (1 + 0.0033)^{18}$).

Based on the *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study*, the cut-through trips were generated by following the same agreed process between Renard Development Company, LLC and Maryland SHA (Renard Development Company 2014). This process assumed 8 percent of the daily vehicles would travel during the peak hours. The directional split between those vehicles traveling toward I-95/I-495 or from I-95/I-495 would differ by time of day. During the AM peak hour, a 60/40 split was followed (60 percent of vehicles would be destined to I-95/I-495). During the PM peak hour, the direction split was reversed (40/60). Table 4-18 shows the cut-through trip process.

Table 4-18: Cut-through Trip Process

Steps	Value
Forecasted 2040 Daily Volume	8,582
Forecasted 2022 Daily Volume (Reverse Compound Formula for 18 years)	8,088
Peak Hour Volume (8 percent of Daily Volume)	647
AM Inbound to I-95/I-495/ PM outbound from I-95/I-495 (60 percent)	388
AM outbound from I-95/I-495/ PM inbound to I-95/I-495 (40 percent)	259

4.8.4 Trip Distribution

Once the total number of new vehicle trips was calculated through the trip generation process, the trips were systematically and logically distributed across the road network. This is typically a straightforward process, emulating the existing travel patterns on roadways. However, in this case, with new developments and new roadways introduced as part of the No-build Condition, the process required several additional steps to complete including the following:

1. Add the planned development trips.
2. Add the growth in Greenbelt Metro Station trips (WMATA garage and Kiss & Ride).
3. Add the growth in buses serving the Greenbelt Metro Station.
4. Add the background growth rate trips.
5. Add the cut-through vehicle trips.

4.8.4.1 Planned Development Trip Distribution

The planned developments included the North and South Core developments, plus the two Capital Office Park developments. The study followed the North Core distribution values based on the *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study* for the North and South Core planned land uses and MWCOG travel demand model trip tables from Version 2.3.52 Travel Demand Model for 2020 for the Capital Office Park developments (Renard Development Company 2014; MWCOG 2014b).

The *Greenbelt WMATA, Mixed-Use, and FBI Headquarters* study provided distributions for office, retail, hotel, and residential uses. Because the South Core development is in proximity to the North Core, the same distribution patterns were followed except for trips destined to Kenilworth Avenue to the south. It was assumed that these trips would use Greenbelt Road to access Kenilworth Avenue rather than Cherrywood Lane.

Trip tables from the 2020 model were obtained from MWCOG representing all trips originating at home for all purposes such as work or shopping (MWCOG 2014a). A transportation analysis zone (TAZ), which is the smallest geographical unit within a travel demand model, was selected to capture the travel patterns to and from office uses. TAZ 893, representing a 2020 forecast of 3,299 jobs, is located between Sunnyside Avenue and I-95/I-495. This zone represents the largest employment adjacent to the Greenbelt site TAZ.

Table 4-19 contains the distribution percentages for each planned development. Appendix C7 contains maps showing the distribution patterns for each planned development.

Table 4-19: Planned Development Trip Distribution

Origin / Destination	North Core				South Core		Capital Office Park
	Office	Residential	Retail	Hotel	Residential	Retail	Office
I-95/I-495 North	35%	30%	10%	50%	30%	10%	31%
I-95/I-495 South	30%	30%	10%	50%	30%	10%	26%
U.S. Route 1 North	0%	0%	0%	0%	0%	0%	12.5%
Edmonston Road North	7.5%	7.5%	12.5%	0%	7.5%	12.5%	2%
Kenilworth Avenue South	7.5%	7.5%	12.5%	0%	0%	0%	9.5%
Greenbelt Road West	7.5%	12.5%	12.5%	0%	12.5%	12.5%	11%
Greenbelt Road East	7.5%	12.5%	12.5%	0%	20%	25%	8%
Breezewood/Springhill Drive	5%	0%	30%	0%	0%	30%	0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

4.8.4.2 Distribution of Future Forecasted WMATA-based Vehicle Trips

The Greenbelt Metro Station forecasted future trips were distributed based on the travel patterns recorded during the peak hour of the existing station, not the peak hour of the study area to capture the highest vehicle flow for the calculation. The *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study* captured those volumes to develop the distribution pattern (Renard Development Company 2014). Prior to performing the calculations, the volumes representing the buses were removed, since the bus distribution pattern was separately determined. Table 4-20 summarizes the WMATA-based distribution pattern. Appendix C7 contains maps showing the distribution patterns for both peak hours.

Table 4-20: WMATA-based Distribution Pattern

Origin / Destination	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
I-95/I-495 North	42%	21%	30%	50%
I-95/I-495 South	22%	25%	32%	16%
Edmonston Road North	11%	11.5%	8.5%	8.5%
Kenilworth Avenue South	11%	11.5%	8.5%	8.5%
Greenbelt Road West	3.5%	8%	7%	4%
Greenbelt Road East	3.5%	8%	7%	4%
Breezewood/Springhill Drive	7%	15%	7%	9%
Total	**100%**	**100%**	**100%**	**100%**

4.8.4.3 Distribution of New Bus Trips

Bus trips followed the existing pattern of bus routes serving the Greenbelt Metro Station. All buses currently serve the station using Greenbelt Metro Drive; therefore, it was assumed that condition would not change in the future. Because the total number of vehicles added was small, trips were not distributed to all destinations, specifically Sunnyside Avenue. Table 4-21 summarizes the bus distribution pattern. Appendix C7 contains a map showing the bus distribution pattern for both peak hours.

Table 4-21: WMATA-based Distribution Pattern

Origin/Destination	Percent
Edmonston Road North	20%
Kenilworth Avenue South	25%
Greenbelt Road West	20%
Greenbelt Road East	20%
60th Avenue	10%
Sunnyside Avenue	5%
Total	**100%**

4.8.4.4 Background Growth Rate

Once all the vehicle trips were properly shifted, the planned development growth applied, and the WMATA-based growth applied, the vehicle background growth trips were applied. This consisted of applying a 0.33 percent annual growth factor to all roadways (non-Interstate and Interstate) based on the volumes after shifting existing vehicle trips due to the opening of the new North and South Core roadway network and new interstate ramps. The new North and South Core roadways themselves were not grown to avoid double-counting because they already contained the growth from the planned developments and Greenbelt Metro Station-based growth. In addition, the cut-through volumes were added to these roadways based on the new connections to/from the Interstate becoming available. Appendix C7 contains a map showing the background growth pattern for both peak hours.

4.8.4.5 Cut-through Traffic Distribution

Lastly, the cut-through traffic was distributed to the study area roadways causing some volumes to increase and some to decrease. For example, ramp volumes serving U.S. Route 1 and Kenilworth Avenue to/from I-95/I-495 decreased reflecting the shift in vehicles from these facilities to the new North and South Core roadway network and interchange. The distribution pattern followed a similar pattern as the *Greenbelt WMATA, Mixed-Use, and FBI Headquarters Study*, extending it to the study area boundary (Renard Development Company 2014). It was assumed that the vehicles using Greenbelt Metro Drive would either be destined to the Ivy Lane office corridor or Breezeway/Springhill Drive residential corridor. These vehicle trips would be shifted from Kenilworth Avenue. It was also assumed that the vehicles using Greenbelt Station Parkway from Greenbelt Road would be split 50/50 between destinations to the east or west along Greenbelt Road. These vehicle trips would be shifted from Kenilworth Avenue (Greenbelt Road to the east) or the U.S. Route 1 corridor (Greenbelt Road to the west).

Table 4-22 contains the cut-through distributions. Figures 4-10 and 4-11 show the shifted trip patterns. Appendix C7 contains a map showing the cut-through distributions.

Table 4-22: Cut-through Traffic Distribution

Origin/Destination	Percent
Interstate Split	
I-95/I-495 North	50%
I-95/I-495 South	50%
Local Destinations	
Ivy lane Corridor	17%
Greenbelt Road West	25%
Greenbelt Road East	25%
Breezewood Drive	16.5%
Springhill Drive	16.5%
Total	**100%**

Figure 4-10: Shifted Trip Pattern between Kenilworth Avenue (MD 201) and Proposed Greenbelt Interchange

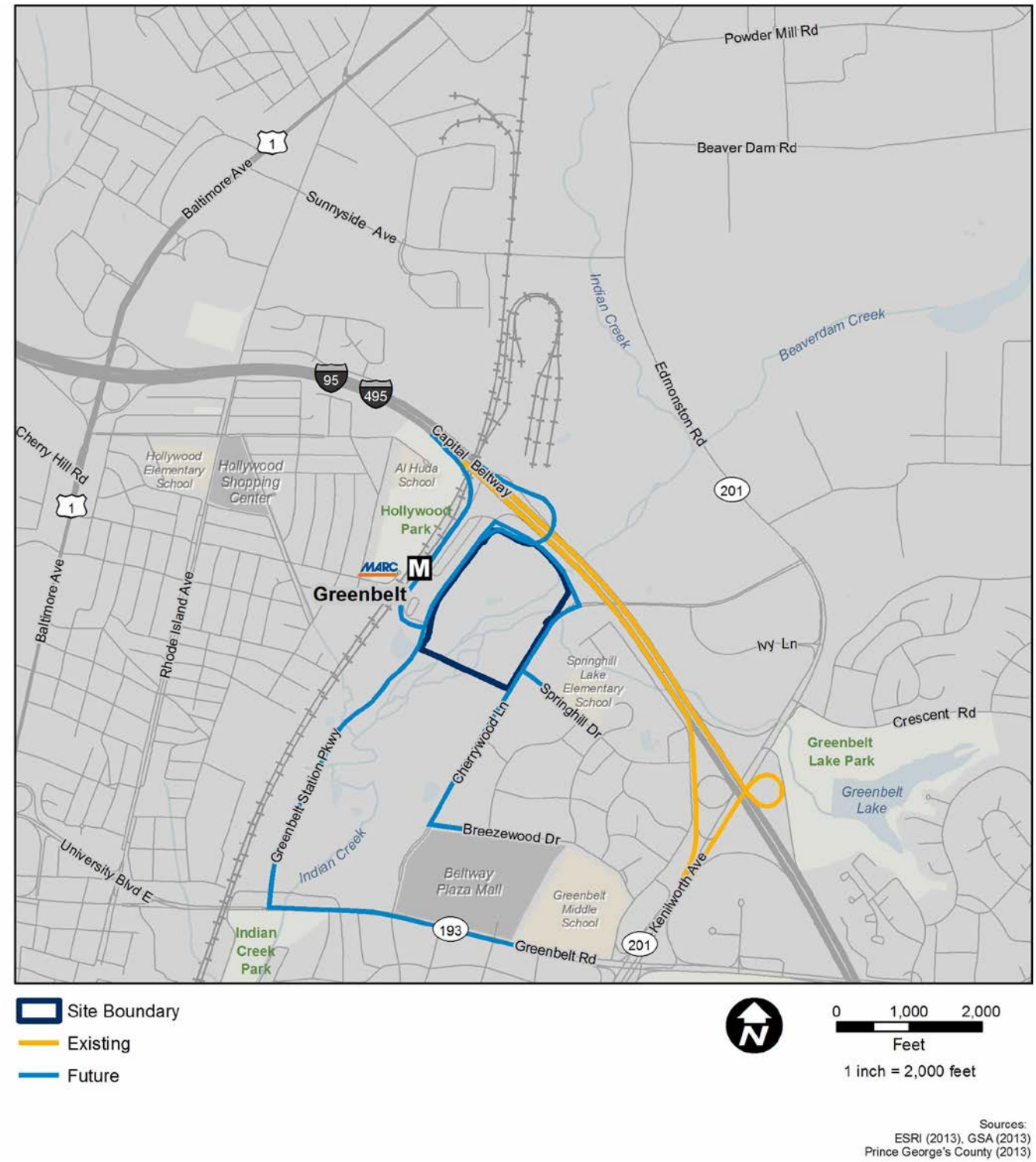
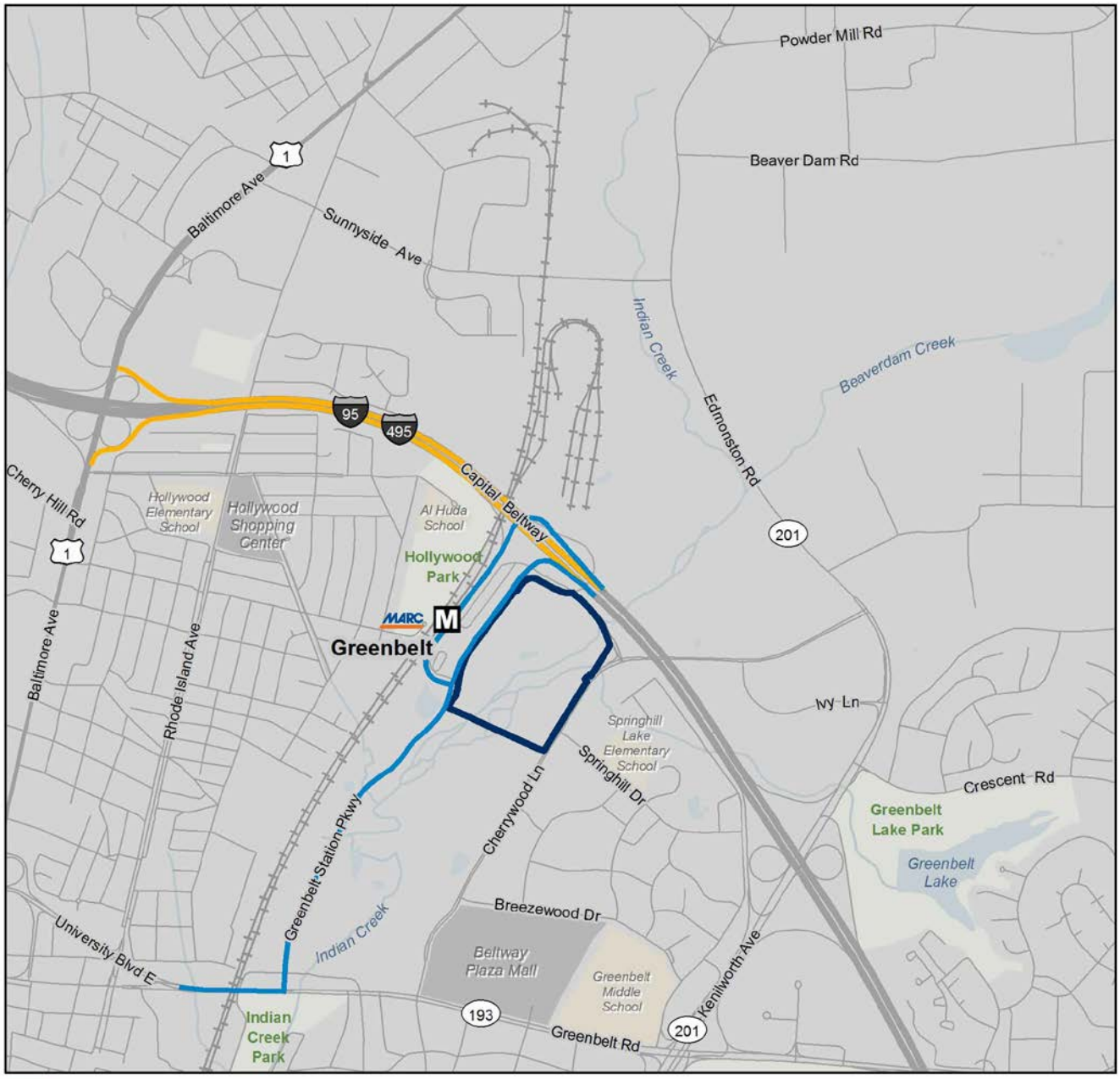


Figure 4-11: Shifted Trip Pattern between U.S. Route 1 and Proposed Greenbelt Interchange



4.8.5 Development of No-build Condition

The planned developments, Greenbelt Metro Station growth, background growth, cut-through trips, and planned roadway improvements were summed together to create complete No-build Condition vehicle volumes covering all study area intersections and Interstate facilities. Figure 4-12 shows the No-Build Condition total background turning movement volumes. Combining the total background and existing condition trips, figure 4-13 shows the No-build Condition turning movement volumes. All intersection facilities were evaluated based on a PHF of 0.92. The PHF is the ratio of the 60-minute volume divided by 4 times the highest 15-minute volume in the peak hour of the day. We are using the lowest accepted value by the Virginia Department of transportation (VDOT) to be consistent for all three sites, and to use a conservative value for the analysis of future facilities.

The PHF is used to convert 60-minute volumes into peak 15-minute volumes because the HCM traffic operations analysis procedures require a 15-minute peak volume. The PHF is the ratio of the 60-minute volume divided by 4 times the highest 15-minute volume in the peak hour of the day. All transportation facilities in the study area were evaluated based on a peak hour factor (PHF) of 0.92. The study uses the lowest accepted value following the VDOT requirement that all future facility traffic evaluation use a PHF between 0.92 and 1.00 to be consistent for all three sites, and to use the most conservative value for the analysis of future facilities (VDOT 2012). Since the HCM 2000 traffic analysis is based on a 15-minute period, a PHF of 0.92 represents an analyzed vehicle volume based on the highest 15-minute vehicle volume. As a comparison, a PHF of 1.0 represents an analyzed vehicle volume based on a uniform 15-minute vehicle volume or the least conservative.

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Figure 4-12: No-build Condition Total background Turning Movement Volumes

Figure 4-12: No-build Condition Total background Turning Movement Volumes (continued)

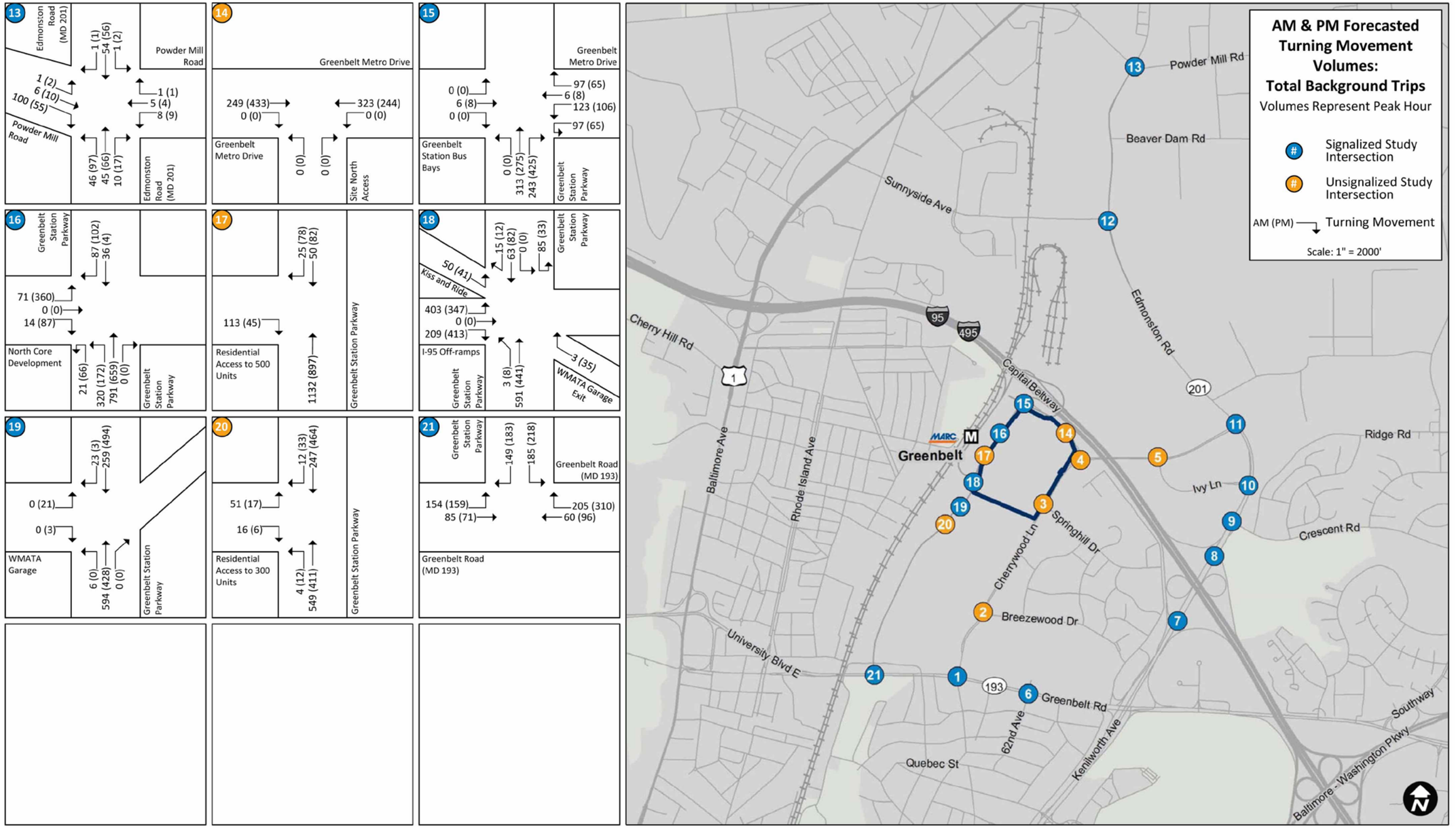


Figure 4-13: No-build Condition Turning Movement Volumes

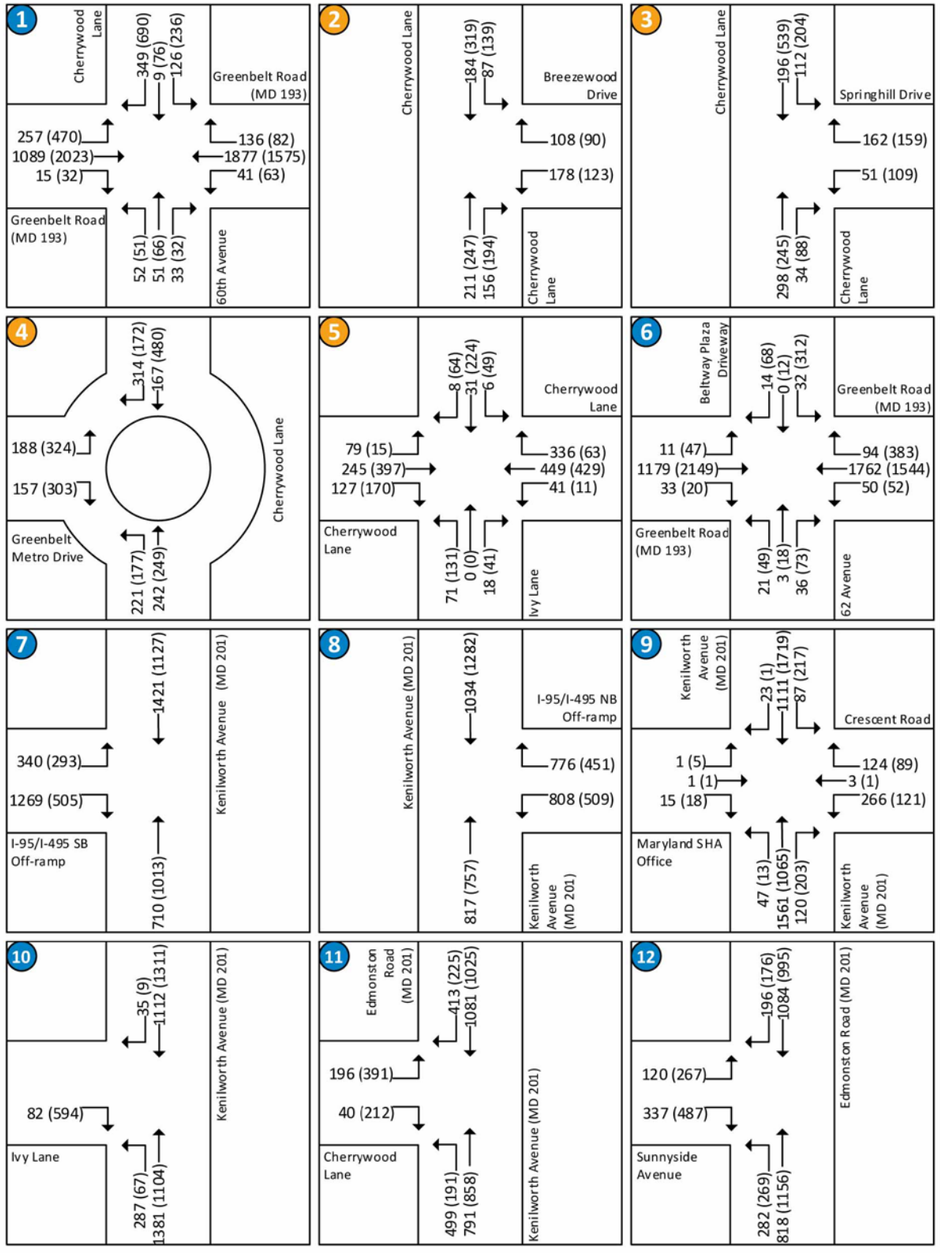
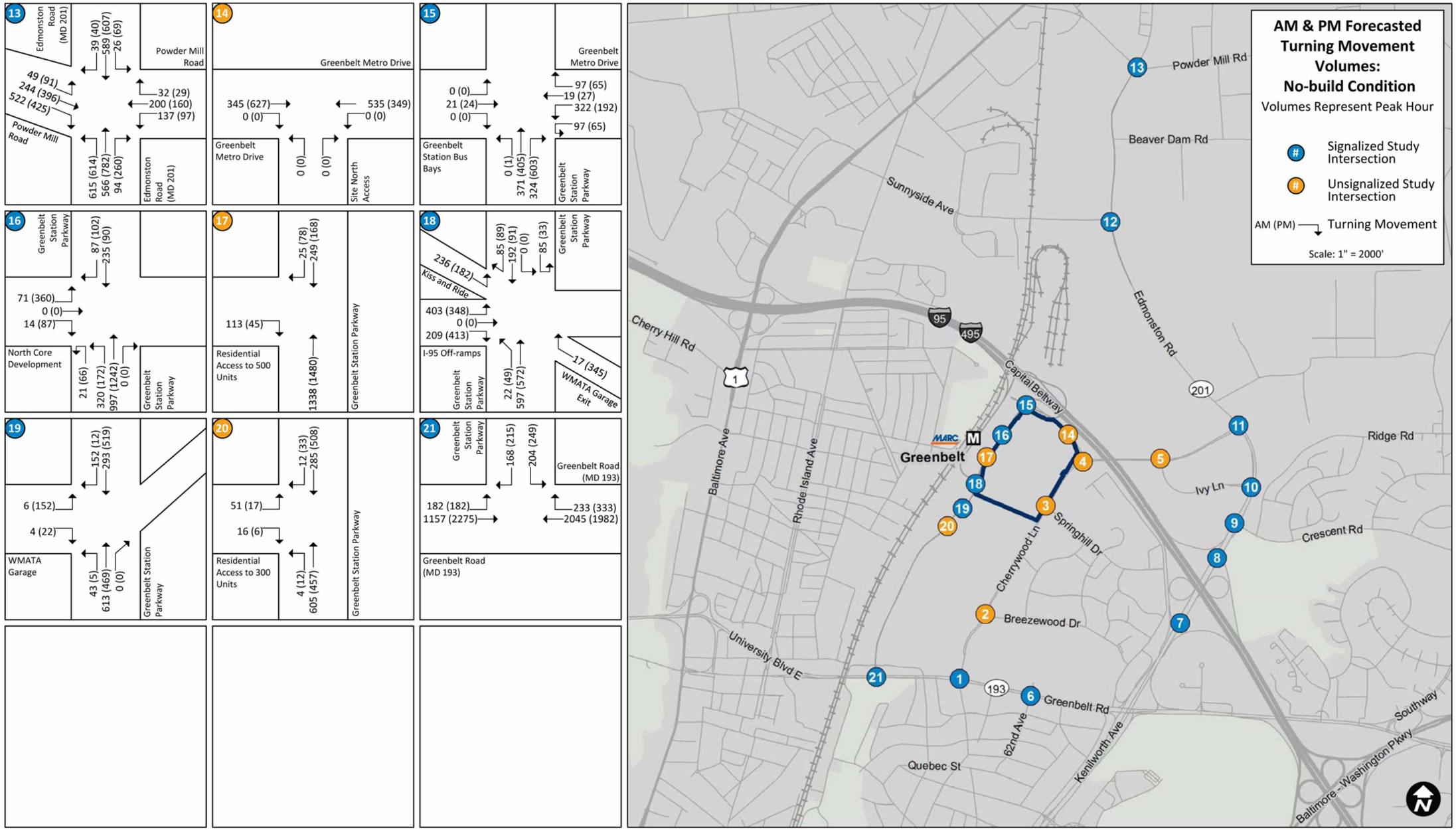


Figure 4-13: No-build Condition Turning Movement Volumes (continued)



4.8.6 No-build Condition Operations Analysis

Synchro™ was used to calculate the vehicle delay and LOS operation based on the HCM 2000 method for each study area intersection. Custom designed Excel sheets were used to calculate the LOS operation based on the Critical Lane Volume (CLV) method.

4.8.6.1 Signalized Intersection Operations Analysis

Based on the Synchro™ and CLV-based Excel worksheet analysis, many of the signalized study area intersections operate at acceptable overall conditions during the morning and afternoon peak hours (average control delay exceeds 55 seconds). However, the following intersections in the study area operate with overall unacceptable conditions, which include LOS E or LOS F using the HCM 2000 method or LOS F using the CLV method:

- Edmonston Road (MD 201) and Sunnyside Avenue (Intersection #12) during the PM peak hour
- Edmonston Road (MD 201) and Powder Mill Road (Intersection #13) during the PM peak hour

Based on the Synchro™ analysis, the following individual signalized intersection lane groups or overall approaches operate under unacceptable conditions (LOS E or LOS F) during the morning or afternoon peak hours. The lane group within the approach that is operating under unacceptable conditions is noted in parentheses; when "overall" is noted, the overall approach movements operate under unacceptable conditions. Note that intersections with an asterisk (*) are included in the No-build Condition, but not the Existing Condition.

- Greenbelt Road (MD 193) and Cherrywood Lane/60th Avenue (Intersection #1)
    - Eastbound Greenbelt Road (left turns), during the AM peak hour
    - Westbound Greenbelt Road (left turns), northbound 60th Avenue (overall) and southbound Cherrywood Lane (overall) during the AM and PM peak hours
- Greenbelt Road (MD 193) and 62nd Avenue/Beltway Plaza Driveway (Intersection #6)
    - Northbound 62nd Ave (overall) and southbound Beltway Plaza Drive (overall) during AM and PM peak hours
- Kenilworth Avenue (MD 201) and Crescent Road/Maryland SHA Office (Intersection #9)
    - Southbound Kenilworth Avenue (left turns) during AM peak hour
    - Northbound Kenilworth Avenue (left turns) during the PM peak hour
- Edmonston Road (MD 201) and Sunnyside Avenue (Intersection #12)
    - Eastbound Sunnyside Avenue (overall) and northbound Edmonston Road (left turns) during both the AM and PM peak hours
- Edmonston Road (MD 201) and Powder Mill Road (Intersection #13)
    - Eastbound Powder Mill Road (through movements) and westbound Powder Mill Road (left turns) during the AM peak hour
    - Eastbound Powder Mill Road (overall), westbound Powder Mill Road (left turns), northbound Edmonston Road (left turns) and southbound Edmonston Road (overall) during the PM peak hour
- Greenbelt Station Bus Bays/Greenbelt Metro Drive and Greenbelt Station Parkway* (Intersection #15)
    - Eastbound Greenbelt Station bus bays (overall) and westbound Greenbelt Metro Drive (left turns) during the AM peak hour
- Greenbelt Station Parkway and North Core Development/Site Northwest Access* (Intersection #16)
    - Eastbound North Core Development (overall) during the AM peak hour
- Greenbelt Station Parkway and I-95/I-495 Off-ramps/Site South Access/Kiss & Ride* (Intersection #18)
    - Eastbound I-95 Off-ramps (overall), eastbound kiss and ride (overall), and northbound Greenbelt Station Parkway (left turns) during the AM peak hour

    - Southbound Greenbelt Station Parkway (overall) during the PM peak hour
- Greenbelt Station Parkway and WMATA Garage* (Intersection #19)
    - Eastbound WMATA garage (overall) and northbound Greenbelt Station Parkway (combined left and through movements) during the AM peak hour
- Greenbelt Road (MD 193) and Greenbelt Station Parkway* (Intersection #21)
    - Eastbound Greenbelt Road (left turns) and southbound Greenbelt Station Parkway (overall) during the AM peak hour
    - Eastbound Greenbelt Road (left turns) and southbound Greenbelt Station Parkway (left turns) during the PM peak hour

4.8.6.2 Unsignalized Intersection Operations Analysis

Based on the unsignalized intersection analysis, only the intersection of Cherrywood Lane and Ivy Lane (Intersection #5) operates at overall unacceptable conditions during the PM peak hour. All other unsignalized intersections in the study area operate at acceptable overall conditions during the AM and PM peak hours.

The following individual unsignalized intersection lane groups or overall approaches also operate under unacceptable conditions (LOS E or LOS F) during the morning or afternoon peak hours:

- Westbound Springhill Drive (overall) at the intersection of Cherrywood Lane and Springhill Drive during the PM peak hour

- In addition to the overall intersection failing at Cherrywood Lane and Ivy Lane during the PM peak hour, the northbound (left and through movement) and southbound (all movements) approaches on Ivy Lane fail during the AM peak hour

4.8.6.3 Complete Intersection Operations Analysis

This section summarizes the differences in LOS impacts between the Existing Condition and the No-build Condition by quantifying the change in intersection operation failures. Following the summary, this section also includes the complete results of the operations analysis in both figures and a table.

Based on the Synchro™ analysis, a total of 10 signalized and 2 unsignalized intersections would experience an unacceptable conditions for one or more turning movements. Compared to the Existing Condition, the No-build Condition would have no change in the number of intersections failing during the AM peak hour and there would be one more intersection failing during the PM peak hour. In the AM peak hour, compared to the Existing Condition, there are zero intersections that passed overall but would fail, 13 that would not change, and zero that were failing but would now pass. In the PM peak hour, there are two intersections that passed overall but would now fail, 10 that would not change, and one that was failing but would now pass.

Table 4-23 provides a summary of the number of intersections that meet the following criteria for the overall directional approach that would change between the Existing Condition and the No-build Condition:

- New Failing Approach
    - Number of intersections that have at least one failing overall approach that did **NOT** have a failing overall approach in the previous condition

- Additional Failing Approaches
    - Number of intersections that had at least one failing overall approach in the previous condition and now would have additional/more failing overall approaches than before

- No Change
    - Number of intersections that would have no change in the number of failing overall approaches, or the number of failing overall approaches would be the same as in the previous condition

- Fewer Failing Approaches
    - Number of intersections that would have less failing overall approaches than the previous condition, but still would have some failing overall approaches

- No Failing Approaches
    - Number of intersections that had failing overall approaches in the previous condition, but would no longer have failing overall approaches

Table 4-23: Intersection Operations Summary Comparing Existing Condition to No-build Condition

Type of Change Between Conditions	AM	PM
New Failing Approach	1	2
Additional Failing Approaches	0	1
No Change	11	9
Fewer Failing Approaches	1	0
No Failing Approaches	0	1
Total Signalized and Unsignalized Intersections	**13**	**13**

The average LOS for the various approaches to the intersections and the overall intersection LOS grades for the No-build Condition are depicted in figures 4-14 and 4-15 for the AM and PM peak hours, respectively. Table 4-24 shows the results of the LOS capacity analysis and the intersection projected delay under the No-build Condition conditions during the AM and PM peak hours.

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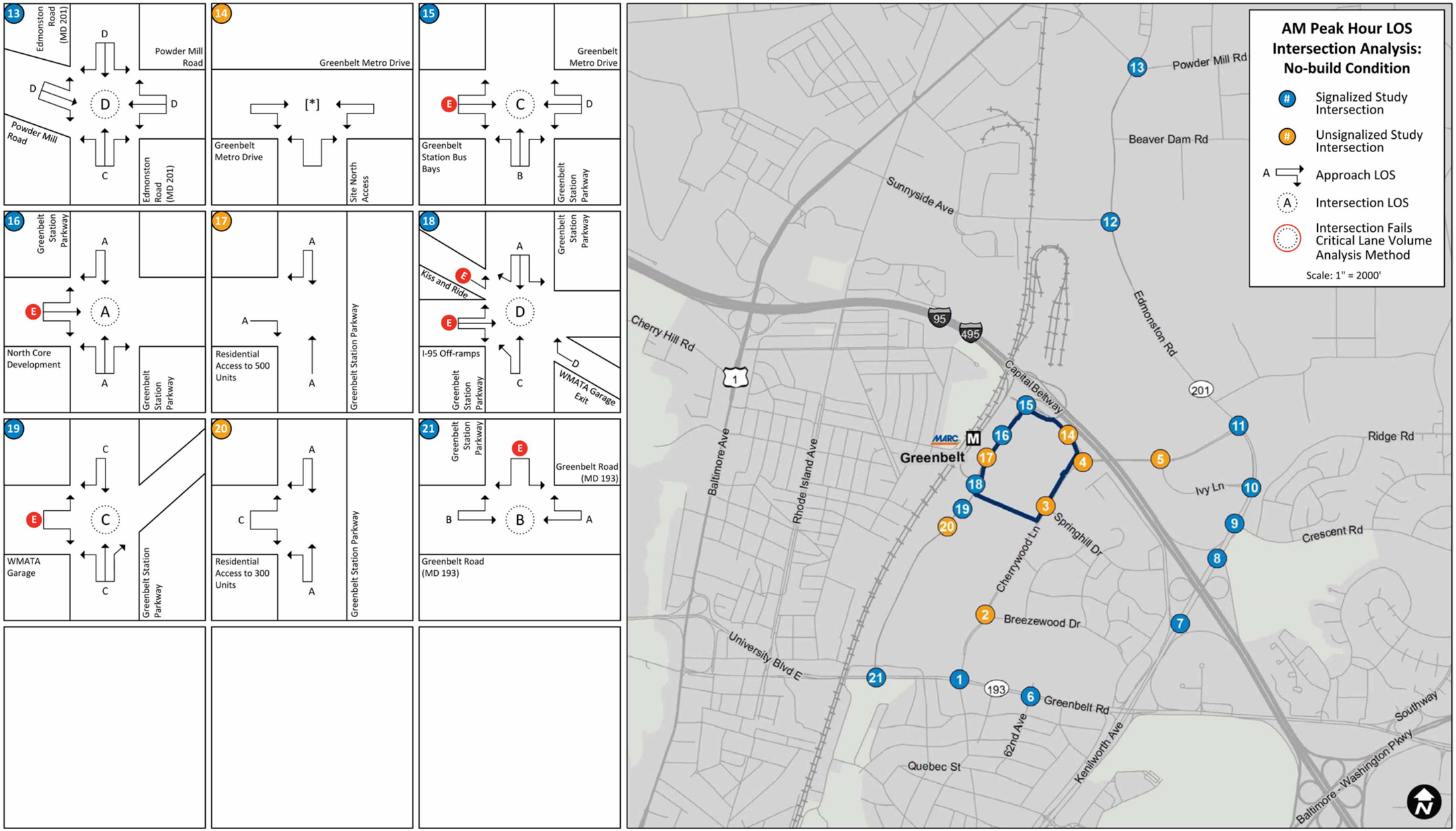
Figure 4-14: No-build Condition Intersection LOS for AM Peak Hour

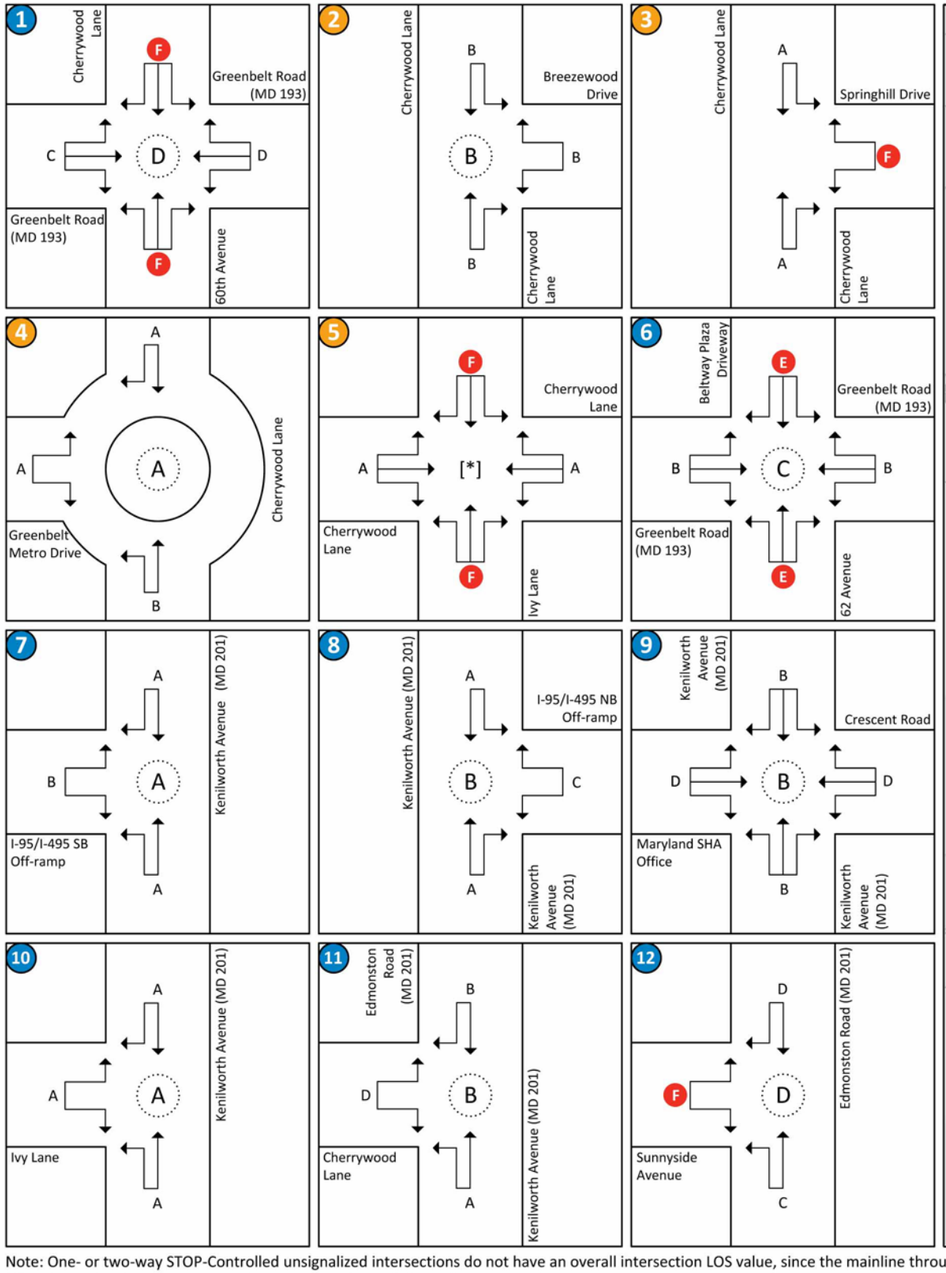
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] =Intersection #14 for use with the Build condition, but was included as part of the No-build design provided by Renard Development Company, LLC.

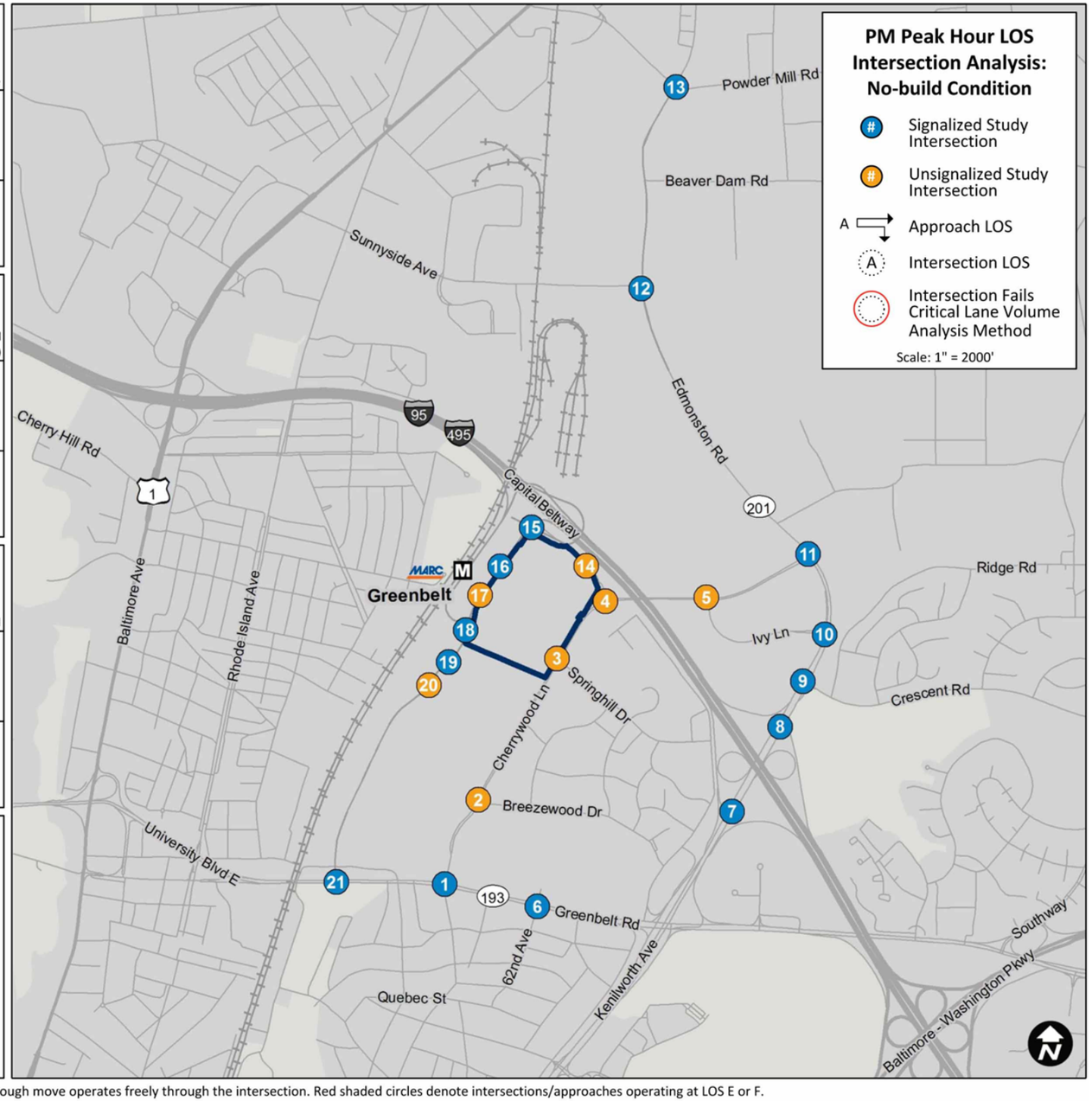
Figure 4-14: No-build Condition Intersection LOS for AM Peak Hour (continued)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] =Intersection #14 for use with the Build condition, but was included as part of the No-build design provided by Renard Development Company, LLC.

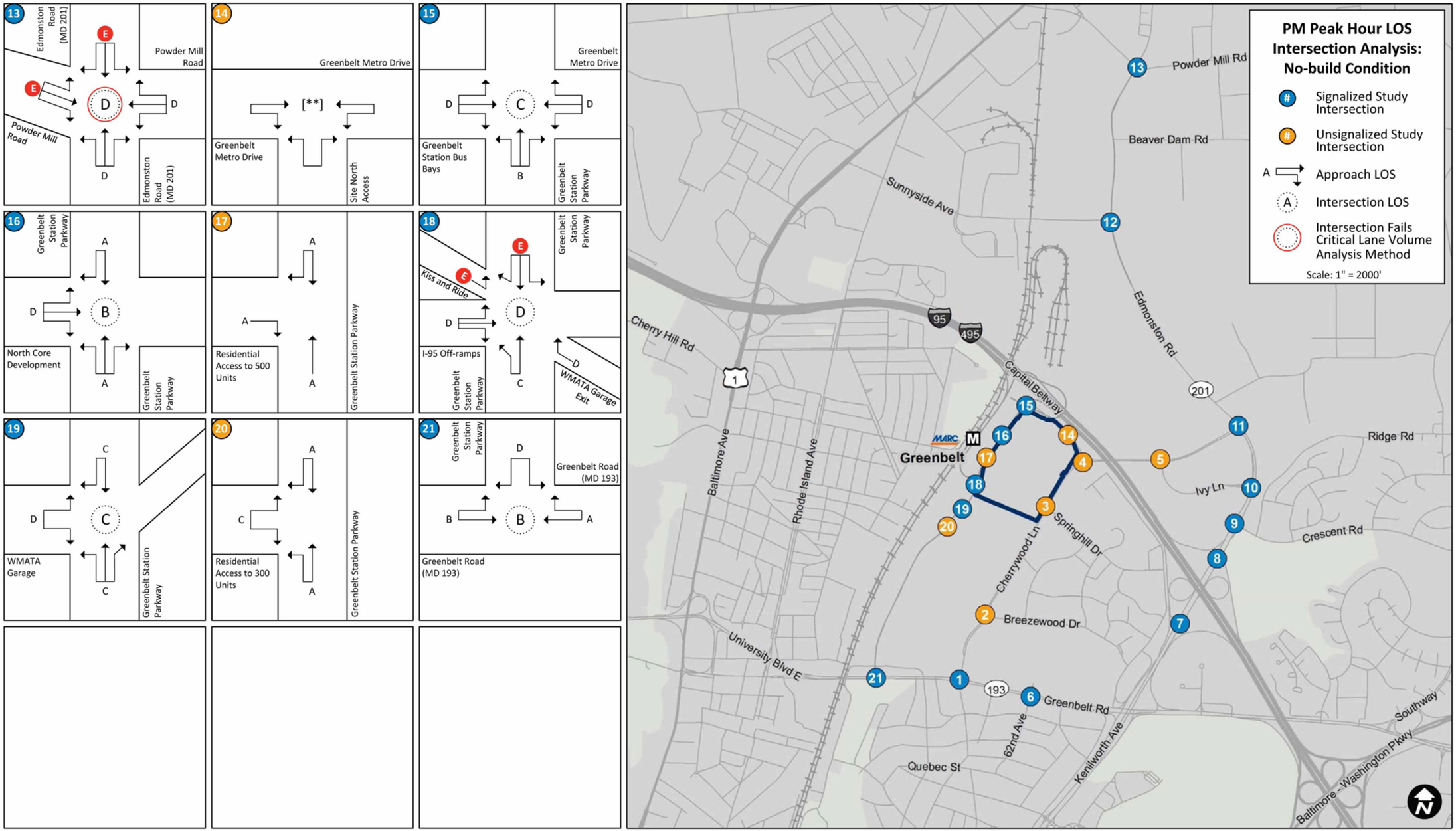
Figure 4-15: No-build Condition Intersection LOS for PM Peak Hour





Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.
[**] =Intersection #14 for use with the Build condition, but was included as part of the No-build design provided by Renard Development Company, LLC.

Figure 4-15: No-build Condition Intersection LOS for PM Peak Hour (continued)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.
[**] =Intersection #14 for use with the Build condition, but was included as part of the No-build design provided by Renard Development Company, LLC.

Table 4-24: No-build Condition AM and PM Peak Hour Operations Analysis

#	Intersection and Approach	Lane Group	AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Volume	LOS		Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	
1	**Greenbelt Road (MD 193) & Cherrywood Lane/60th Avenue (Signalized)**											
	EB (Greenbelt Rd)	L	63.2	E				53.0	D			
	EB (Greenbelt Rd)	TR	8.8	A				13.9	B			
	EB Overall (Greenbelt Rd)		**19.1**	**B**				**21.2**	**C**			
	WB (Greenbelt Rd)	L	64.2	E				67.0	E			
	WB (Greenbelt Rd)	TR	20.6	C				35.7	D			
	WB Overall (Greenbelt Rd)		**21.5**	**C**				**36.9**	**D**			
	NB (60th Ave)	LTR	74.0	E				132.4	F			
	NB Overall (60th Ave)		**74.0**	**E**				**132.4**	**F**			
	SB (Cherrywood Ln)	L	76.7	E				106.8	F			
	SB (Cherrywood Ln)	LT	76.7	E				108.0	F			
	SB (Cherrywood Ln)	R	70.0	E				83.5	F			
	SB Overall (Cherrywood Ln)		**71.9**	**E**				**91.0**	**F**			
	Overall		**28.5**	**C**	**1,315**	**D**	**Pass**	**42.2**	**D**	**1,504**	**E**	**Pass**
2	**Cherrywood Lane & Breezewood Drive (AWSC)**											
	WB (Breezewood Dr)	LR	13.3	-				12.5	-			
	WB Overall (Breezewood Dr)		**13.3**	**B**				**12.5**	**B**			
	NB (Cherrywood Ln)	T	11.2	-				12.4	-			
	NB (Cherrywood Ln)	R	8.7	-				9.4	-			
	NB Overall (Cherrywood Ln)		**10.1**	**B**				**11.1**	**B**			
	SB (Cherrywood Ln)	L	9.7	-				10.5	-			
	SB (Cherrywood Ln)	T	10.8	-				15.1	-			
	SB Overall (Cherrywood Ln)		**10.4**	**B**				**13.7**	**B**			
	Overall		**11.2**	**B**	**N/A**	**N/A**	**Pass**	**12.5**	**B**	**N/A**	**N/A**	**Pass**
3	**Cherrywood Lane & Springhill Drive (TWSC)**											
	WB (Springhill Dr)	LR	16.4	C				128.6	F			
	WB Overall (Springhill Dr)		**16.4**	**C**				**128.6**	**F**			
	SB (Cherrywood Ln)	L	8.3	A				8.7	A			
	SB Overall (Cherrywood Ln)		**3.0**	**-**				**2.4**	**-**			
	Overall		**5.2**	**-**	**N/A**	**N/A**	**Pass**	**27.0**	**-**	**N/A**	**N/A**	**Pass**
4	**Cherrywood Lane & Greenbelt Metro Drive (Roundabout)** [a]											
	EB (Greenbelt Metro Dr)	LR	6.1	A				14.6	B			
	EB Overall (Greenbelt Metro Dr)		**3.3**	**A**				**7.5**	**A**			
	NB (Cherrywood Ln)	LT	11.8	B				14.4	B			
	NB Overall (Cherrywood Ln)		**11.8**	**B**				**14.4**	**B**			
	SB (Cherrywood Ln)	T	6.3	A				12.0	B			
	SB Overall (Cherrywood Ln)		**2.2**	**A**				**8.9**	**A**			
	Overall		**6.0**	**A**	**N/A**	**N/A**	**Pass**	**9.8**	**A**	**N/A**	**N/A**	**Pass**

Table 4-24: No-build Condition AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV			HCM 2000		CLV		
			Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	Check	Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	Check
5	**Cherrywood Lane & Ivy Lane (TWSC)**											
	EB (Cherrywood Ln)	LTR	3.0	A				0.4	A			
	EB Overall (Cherrywood Ln)		**3.0**	**-**				**0.4**	**-**			
	WB (Cherrywood Ln)	L	8.3	A				8.8	A			
	WB (Cherrywood Ln)	TR	0.0	-				0.0	-			
	WB Overall (Cherrywood Ln)		**0.4**	**-**				**0.2**	**-**			
	NB (Ivy Ln)	LT	67.2	F				^	F			
	NB (Ivy Ln)	R	10.3	B				12.1	B			
	NB Overall (Ivy Ln)		**55.7**	**F**				^	**F**			
	SB (Ivy Ln)	LTR	41.0	E				402.7	F			
	SB Overall (Ivy Ln)		**41.0**	**E**				**402.7**	**F**			
	Overall		**6.0**	**-**	**N/A**	**N/A**	**Pass**	[b]	**-**	**N/A**	**N/A**	**Fail**
6	**Greenbelt Road (MD 193) & 62 Avenue/Beltway Plaza Driveway (Signalized)**											
	EB (Greenbelt Rd)	L	1.7	A				7.0	A			
	EB (Greenbelt Rd)	TR	2.6	A				11.3	B			
	EB Overall (Greenbelt Rd)		**2.6**	**A**				**11.2**	**B**			
	WB (Greenbelt Rd)	L	4.0	A				24.7	C			
	WB (Greenbelt Rd)	T	7.5	A				18.3	B			
	WB (Greenbelt Rd)	R	4.7	A				14.8	B			
	WB Overall (Greenbelt Rd)		**7.2**	**A**				**17.8**	**B**			
	NB (62th Ave)	LTR	68.1	E				71.4	E			
	NB Overall (62th Ave)		**68.1**	**E**				**71.4**	**E**			
	SB (Beltway Plaza Drwy)	L	68.2	E				69.8	E			
	SB (Beltway Plaza Drwy)	LT	68.3	E				69.5	E			
	SB (Beltway Plaza Drwy)	R	66.7	E				54.9	D			
	SB Overall (Beltway Plaza Drwy)		**67.8**	**E**				**67.1**	**E**			
	Overall		**7.5**	**A**	**742**	**A**	**Pass**	**20.4**	**C**	**1,206**	**C**	**Pass**
7	**Kenilworth Avenue (MD 201) & I-95/I-495 SB Off-ramp (Signalized)**											
	EB (I-95/I-495 SB Off-ramp)	L	39.7	D				39.7	D			
	EB (I-95/I-495 SB Off-ramp)	R	6.9	A				0.6	A			
	EB Overall (I-95/I-495 SB Off-ramp)		**13.8**	**B**				**14.9**	**B**			
	NB (Kenilworth Ave)	T	4.0	A				4.0	A			
	NB Overall (Kenilworth Ave)		**4.0**	**A**				**4.0**	**A**			
	SB (Kenilworth Ave)	T	6.2	A				3.6	A			
	SB Overall (Kenilworth Ave)		**6.2**	**A**				**3.6**	**A**			
	Overall		**9.1**	**A**	**730**	**A**	**Pass**	**6.8**	**A**	**593**	**A**	**Pass**

Table 4-24: No-build Condition AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Volume	LOS		Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	
8	**Kenilworth Avenue (MD 201) & I-95/I-495 NB Off-ramp (Signalized)**											
	WB (I-95/I-495 NB Off-ramp)	L	24.6	C				34.3	C			
	WB (I-95/I-495 NB Off-ramp)	R	26.3	C				31.1	C			
	WB Overall (I-95/I-495 NB Off-ramp)		**25.4**	**C**				**32.8**	**C**			
	NB (Kenilworth Ave)	T	11.1	B				5.4	A			
	NB Overall (Kenilworth Ave)		**11.1**	**B**				**5.4**	**A**			
	SB (Kenilworth Ave)	T	7.7	A				3.4	A			
	SB Overall (Kenilworth Ave)		**7.7**	**A**				**3.4**	**A**			
	Overall		**16.7**	**B**	**868**	**A**	**Pass**	**13.3**	**B**	**779**	**A**	**Pass**
9	**Kenilworth Avenue (MD 201) & Crescent Road/Maryland SHA Office (Signalized)**											
	EB (Maryland SHA Office)	LTR	26.0	C				36.1	D			
	EB Overall (Maryland SHA Office)		**26.0**	**C**				**36.1**	**D**			
	WB (Crescent Rd)	LT	43.2	D				47.8	D			
	WB (Crescent Rd)	R	26.6	C				36.3	D			
	WB Overall (Crescent Rd)		**38.0**	**D**				**43.0**	**D**			
	NB (Kenilworth Ave)	L	47.4	D				61.5	E			
	NB (Kenilworth Ave)	T	13.3	B				10.4	B			
	NB (Kenilworth Ave)	R	8.5	A				5.9	A			
	NB Overall (Kenilworth Ave)		**13.9**	**B**				**10.2**	**B**			
	SB (Kenilworth Ave)	L	67.1	E				53.3	D			
	SB (Kenilworth Ave)	T	4.7	A				5.8	A			
	SB (Kenilworth Ave)	R	12.0	B				4.9	A			
	SB Overall (Kenilworth Ave)		**9.3**	**A**				**11.1**	**B**			
	Overall		**15.1**	**B**	**962**	**A**	**Pass**	**12.9**	**B**	**796**	**A**	**Pass**
10	**Kenilworth Avenue (MD 201) & Ivy Lane (Signalized)**											
	EB (Ivy Ln)	R	0.1	A				0.7	A			
	EB Overall (Ivy Ln)		**0.1**	**A**				**0.7**	**A**			
	NB (Kenilworth Ave)	L	18.6	B				25.8	C			
	NB (Kenilworth Ave)	T	0.3	A				0.2	A			
	NB Overall (Kenilworth Ave)		**3.4**	**A**				**1.7**	**A**			
	SB (Kenilworth Ave)	T	0.7	A				1.2	A			
	SB (Kenilworth Ave)	R	0.0	A				0.0	A			
	SB Overall (Kenilworth Ave)		**0.7**	**A**				**1.2**	**A**			
	Overall		**2.3**	**A**	**784**	**A**	**Pass**	**1.3**	**A**	**761**	**A**	**Pass**

Table 4-24: No-build Condition AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Volume	LOS		Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	
11	**Kenilworth Avenue/Edmonston Road (MD 201) & Cherrywood Lane (Signalized)**											
	EB (Cherrywood Ln)	L	46.7	D				39.4	D			
	EB (Cherrywood Ln)	R	40.7	D				33.8	C			
	EB Overall (Cherrywood Ln)		**45.7**	**D**				**37.5**	**D**			
	NB (Kenilworth Ave)	L	27.0	C				13.8	B			
	NB (Kenilworth Ave)	T	1.1	A				1.2	A			
	NB Overall (Kenilworth Ave)		**11.1**	**B**				**3.5**	**A**			
	SB (Edmonston Rd)	T	22.6	C				13.9	B			
	SB (Edmonston Rd)	R	17.5	B				10.0	B			
	SB Overall (Edmonston Rd)		**21.2**	**C**				**13.2**	**B**			
	Overall		**18.8**	**B**	**1,212**	**C**	**Pass**	**14.7**	**B**	**990**	**A**	**Pass**
12	**Edmonston Road (MD 201) & Sunnyside Avenue (Signalized)**											
	EB (Sunnyside Ave)	L	108.9	F				113.0	F			
	EB (Sunnyside Ave)	R	66.9	E				62.0	E			
	EB Overall (Sunnyside Ave)		**77.9**	**E**				**80.1**	**F**			
	NB (Edmonston Rd)	L	102.8	F				98.0	F			
	NB (Edmonston Rd)	T	4.4	A				18.3	B			
	NB Overall (Edmonston Rd)		**29.6**	**C**				**33.3**	**C**			
	SB (Edmonston Rd)	T	41.1	D				48.1	D			
	SB (Edmonston Rd)	R	5.0	A				3.8	A			
	SB Overall (Edmonston Rd)		**35.6**	**D**				**41.4**	**D**			
	Overall		**40.1**	**D**	**1,486**	**E**	**Pass**	**46.7**	**D**	**1,692**	**F**	**Fail**

Table 4-24: No-build Condition AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Volume	LOS		Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	
13	**Edmonston Road (MD 201) & Powder Mill Road (Signalized)**											
	EB (Powder Mill Rd)	L	47.3	D				45.2	D			
	EB (Powder Mill Rd)	T	62.8	E				81.1	F			
	EB (Powder Mill Rd)	R	48.7	D				44.7	D			
	EB Overall (Powder Mill Rd)		**52.8**	**D**				**60.5**	**E**			
	WB (Powder Mill Rd)	L	57.0	E				84.1	F			
	WB (Powder Mill Rd)	T	41.8	D				38.4	D			
	WB (Powder Mill Rd)	R	35.6	D				34.1	C			
	WB Overall (Powder Mill Rd)		**46.9**	**D**				**53.4**	**D**			
	NB (Edmonston Rd)	L	48.5	D				76.7	E			
	NB (Edmonston Rd)	T	12.8	B				23.2	C			
	NB (Edmonston Rd)	R	8.4	A				12.5	B			
	NB Overall (Edmonston Rd)		**29.7**	**C**				**41.3**	**D**			
	SB (Edmonston Rd)	L	40.5	D				54.5	D			
	SB (Edmonston Rd)	TR	52.5	D				60.4	E			
	SB Overall (Edmonston Rd)		**52.0**	**D**				**59.8**	**E**			
	Overall		**42.5**	**D**	**1,593**	**E**	**Pass**	**50.9**	**D**	**1,867**	**F**	**Fail**
14	**Greenbelt Metro Drive & Site North Access (TWSC)** [b]											
	EB (Greenbelt Metro Dr)	TR	N/A	N/A				N/A	N/A			
	EB Overall (Greenbelt Metro Dr)		**N/A**	**N/A**				**N/A**	**N/A**			
	WB (Greenbelt Metro Dr)	L	N/A	N/A				N/A	N/A			
	WB (Greenbelt Metro Dr)	T	N/A	N/A				N/A	N/A			
	WB Overall (Greenbelt Metro Dr)		**N/A**	**N/A**				**N/A**	**N/A**			
	NB (Site North Access)	LR	N/A	N/A				N/A	N/A			
	NB Overall (Site North Access)		**N/A**	**N/A**				**N/A**	**N/A**			
	Overall		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 4-24: No-build Condition AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Volume	LOS		Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	
15	**Greenbelt Station Bus Bays/Greenbelt Metro Drive & Greenbelt Station Parkway (Signalized)**											
	EB (Greenbelt Sta Bus Bays)	LT	75.7	E				54.0	D			
	EB (Greenbelt Sta Bus Bays)	R	-	-				-	-			
	EB Overall (Greenbelt Sta Bus Bays)		**75.7**	**E**				**54.0**	**D**			
	WB (Greenbelt Metro Dr)	L	56.6	E				45.2	D			
	WB (Greenbelt Metro Dr)	T	35.7	D				31.7	C			
	WB (Greenbelt Metro Dr)	R	36.0	D				31.5	C			
	WB Overall (Greenbelt Metro Dr)		**52.1**	**D**				**41.6**	**D**			
	NB (Greenbelt Sta Pkwy)	L	-	-				-	-			
	NB (Greenbelt Sta Pkwy)	T	14.3	B				8.4	A			
	NB (Greenbelt Sta Pkwy)	R	13.8	B				21.4	C			
	NB Overall (Greenbelt Sta Pkwy)		**14.0**	**B**				**16.2**	**B**			
	Overall		**31.4**	**C**	**644**	**A**	**Pass**	**23.3**	**C**	**603**	**A**	**Pass**
16	**Greenbelt Station Parkway & North Core Development/Site Northwest Access (Signalized)**											
	EB (North Core Dev)	L	69.2	E				42.1	D			
	EB (North Core Dev)	TR	66.5	E				35.0	C			
	EB Overall (North Core Dev)		**68.8**	**E**				**40.7**	**D**			
	NB (Greenbelt Sta Pkwy)	L	3.9	A				3.6	A			
	NB (Greenbelt Sta Pkwy)	TR	2.2	A				3.4	A			
	NB Overall (Greenbelt Sta Pkwy)		**2.7**	**A**				**3.4**	**A**			
	SB (Greenbelt Sta Pkwy)	TR	0.1	A				0.1	A			
	SB Overall (Greenbelt Sta Pkwy)		**0.1**	**A**				**0.1**	**A**			
	Overall		**5.4**	**A**	**600**	**A**	**Pass**	**11.0**	**B**	**460**	**A**	**Pass**
17	**Greenbelt Station Parkway & Residential Access to 500 Units (TWSC)**											
	EB (Residential Access)	R	9.8	A				9.3	A			
	EB Overall (Residential Access)		**9.8**	**A**				**9.3**	**A**			
	Overall		**0.6**	**-**	**N/A**	**N/A**	**Pass**	**0.2**	**-**	**N/A**	**N/A**	**Pass**

Table 4-24: No-build Condition AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV			HCM 2000		CLV		
			Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	Check	Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	Check
18	**Greenbelt Station Parkway & I-95/I-495 Off-ramps/Site South Access/Kiss & Ride (Signalized)**											
	EB (I-95 Off-ramps)	L	71.7	E				44.8	D			
	EB (I-95 Off-ramps)	LTR	56.3	E				31.2	C			
	EB Overall (I-95 Off-Ramps)		**61.7**	**E**				**36.1**	**D**			
	EB (Kiss and Ride)	L	55.9	E				37.5	D			
	EB Overall (Kiss and Ride)		**55.9**	**E**				**37.5**	**D**			
	WB (Site South Access)	R	37.0	D				35.7	D			
	WB Overall (Site South Access)		**37.0**	**D**				**35.7**	**D**			
	NB (Greenbelt Sta Pkwy)	L	81.8	F				33.4	C			
	NB (Greenbelt Sta Pkwy)	T	30.9	C				23.5	C			
	NB Overall (Greenbelt Sta Pkwy)		**32.7**	**C**				**24.3**	**C**			
	SB (Greenbelt Sta Pkwy)	L	2.9	A				84.5	F			
	SB (Greenbelt Sta Pkwy)	TR	6.6	A				76.4	E			
	SB Overall (Greenbelt Sta Pkwy)		**5.7**	**A**				**77.7**	**E**			
	Overall		**40.0**	**D**	**950**	**A**	**Pass**	**36.9**	**D**	**1,103**	**B**	**Pass**
19	**Greenbelt Station Parkway & WMATA Garage (Signalized)**											
	EB (WMATA Garage)	L	76.3	E				51.0	D			
	EB (WMATA Garage)	R	72.4	E				37.8	D			
	EB Overall (WMATA Garage)		**74.9**	**E**				**49.3**	**D**			
	NB (Greenbelt Sta Pkwy)	LT	65.7	E				51.5	D			
	NB (Greenbelt Sta Pkwy)	TR	3.0	A				4.6	A			
	NB Overall (Greenbelt Sta Pkwy)		**34.7**	**C**				**28.3**	**C**			
	SB (Greenbelt Sta Pkwy)	T	18.8	B				20.5	C			
	SB (Greenbelt Sta Pkwy)	R	38.5	D				12.9	B			
	SB Overall (Greenbelt Sta Pkwy)		**25.5**	**C**				**20.3**	**C**			
	Overall		**31.4**	**C**	**429**	**A**	**Pass**	**27.8**	**C**	**524**	**A**	**Pass**
20	**Greenbelt Station Parkway & Residential Access to 300 Units (TWSC)**											
	EB (Residential Access)	LR	21.1	C				20.8	C			
	EB Overall (Residential Access)		**21.1**	**C**				**20.8**	**C**			
	NB (Greenbelt Sta Pkwy)	LT	0.2	A				0.8	A			
	NB Overall (Greenbelt Sta Pkwy)		**0.1**	**-**				**0.3**	**-**			
	Overall		**1.5**	**-**	**N/A**	**N/A**	**Pass**	**0.6**	**-**	**N/A**	**N/A**	**Pass**

Table 4-24: No-build Condition AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Volume	LOS		Delay (sec/ veh)	LOS	Critical Lane Volume	LOS	
21	**Greenbelt Road (MD 193) & Greenbelt Station Parkway (Signalized)**											
	EB (Greenbelt Rd)	L	63.6	E				70.0	E			
	EB (Greenbelt Rd)	T	3.2	A				8.0	A			
	EB Overall (Greenbelt Rd)		**11.5**	**B**				**12.6**	**B**			
	WB (Greenbelt Rd)	T	3.6	A				4.9	A			
	WB (Greenbelt Rd)	R	0.1	A				1.8	A			
	WB Overall (Greenbelt Rd)		**3.2**	**A**				**4.5**	**A**			
	SB (Greenbelt Sta Pkwy)	L	67.1	E				59.9	E			
	SB (Greenbelt Sta Pkwy)	R	46.0	D				47.4	D			
	SB Overall (Greenbelt Sta Pkwy)		**57.5**	**E**				**54.1**	**D**			
	Overall		**11.1**	**B**	**988**	**A**	**Pass**	**12.7**	**B**	**1,100**	**B**	**Pass**

Notes:

AWSC = All-way STOP-Controlled intersection

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left / through / right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

Delay is Measured in Seconds Per Vehicle.

Red cells denote intersections or approaches operating at unacceptable conditions.

^ Highway Capacity Manual was unable to report accurate delay using default gap acceptance values.

[a] Highway Capacity Software 2010 Roundabout results

[b] Intersection would be included under the Build Condition, but was included as part of the No-build Condition design provided by Renard Development Company, LLC.

4.8.7 No-Build Condition Queuing Analysis

Synchro™ was used to calculate the 50th percentile queue lengths, and SimTraffic™ was used to calculate the 95th percentile queue lengths. The SimTraffic simulations have a statistical accuracy of plus or minus 5.0 percent error for the AM and PM peak hour simulations. Based on the Synchro™ and SimTraffic™ analysis, the following signalized intersection approaches would experience failing queue lengths in Synchro™ or SimTraffic™ (queue exceeds available lane storage). The lane group within the approach that is operating under unacceptable conditions is noted in parentheses Note that intersections with an asterisk (*) are included in the No-build Condition, but not the Existing Condition.

- Greenbelt Road (MD 193) and Cherrywood Lane/60th Avenue (Intersection #1)
  - Northbound 60th Avenue (all movements) during the PM peak hour
- Kenilworth Avenue/Edmonston Road (MD 201) and Cherrywood Lane (Intersection #11)
  - Southbound Edmonston Road (right turns) during the AM peak hour
- Edmonston Road (MD 201) and Sunnyside Avenue (Intersection #12)
  - Eastbound Sunnyside Avenue (right turns) and southbound Edmonston Road (right turns and through movements) during the AM peak hour
  - Eastbound Sunnyside Avenue (all movements), northbound Edmonston Road (all movements), and southbound Edmonston Road (all movements) during the PM peak hour
- Edmonston Road (MD 201) and Powder Mill Road (Intersection #13)
  - Northbound Edmonston Road (left turns) during the PM peak hour
- Greenbelt Station Bus Bays/Greenbelt Metro Drive and Greenbelt Station Boulevard* (Intersection #15)
  - Westbound Greenbelt Metro Drive (left turns) during the AM peak hour
- Greenbelt Station Parkway and I-95/I-495 Off-ramps/Site South Access/Kiss & Ride* (Intersection #18)
  - Eastbound Kiss & Ride (left turns) during the AM peak hour
- Greenbelt Station Parkway and WMATA Garage* (Intersection #19)
  - Eastbound WMATA garage (left turns) during the PM peak hour
- Greenbelt Road (MD 193) and Greenbelt Station Parkway* (Intersection #21)
  - Eastbound Greenbelt Road (left turns), westbound Greenbelt Road (right turns), and southbound Greenbelt Station Parkway (right turns) during the PM peak hour

Five of the six unsignalized intersections would not experience failing queue lengths for the 95th percentile, but the intersection of Cherrywood Lane and Ivy Lane (Intersection #5) would experience 95th percentile failing queues on southbound Ivy Lane (all movements) during the PM peak hour.

The remaining intersections in the study area would all have acceptable No-build Condition queue lengths.

4.8.7.1 Complete Intersection Queuing Analysis

This section summarizes the differences in queuing impacts between the Existing Condition and the No-build Condition by quantifying the change in intersection queuing failures. Following the summary, this section also includes the complete results of the queuing analysis.

Based on the Synchro™ and SimTraffic™ analysis, eight signalized intersections and one unsignalized intersection would experience queuing lengths that would exceed the available storage capacity. The remaining intersections in the study area would provide sufficient storage for the anticipated demand. Compared to the Existing Condition, the No-build Condition would have no change in the number of intersections with failing queues during the AM peak hour and would have one more intersection with failing queues during the PM peak hour. In the AM peak hour in the Existing Condition, there would be two intersections with a failing queue approach compared with two in the No-build Condition, an increase of zero. In the PM peak hour in the Existing

Condition, there would be three intersections with a failing queue approach compared with four in the No-build Condition, an increase of one.

Table 4-25, provides a summary of the number of intersections that meet the following criteria for approach lane groups in a queue that would change between the Existing Condition and the No-build Condition:

- New Failing Movement
  - Number of intersections that have a queuing problem in one or more movements that would **NOT** have a queuing problem in the previous condition

- Additional Failing Movement
  - Number of intersections that had at least one queuing movement failure in the previous condition and now would have additional/more queuing movement failures than before

- No Change
  - Number of intersections that would have no change in the number of queuing movement failures or the number of queuing movement failures would be the same as in the previous condition

- Fewer Failing Movements
  - Number of intersections that would have less queuing movement failures than in the previous condition, but still would have some failing movements

- No Failing Movements
  - Number of intersections that had queuing movement failures in the previous condition, but would no longer have queuing movement failures

Table 4-25: Queuing Summary Comparing Existing Condition to No-build Condition

Type of Change Between Conditions	AM	PM
New Failing Movement	1	2
Additional Failing Movement	1	1
No Change	10	8
Fewer Failing Movements	0	1
No Failing Movements	1	1
Total Signalized and Unsignalized Intersections	**13**	**13**

The results of the No-build Condition queuing analysis for both signalized and unsignalized intersections are presented in table 4-26. Note that the percentile values are expressed in feet, and a car occupies about 25 linear feet of roadway, including the space between cars.

Table 4-26: No-build Condition Queuing Analysis

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
1	**Greenbelt Road (MD 193) & Cherrywood Lane/60th Avenue (Signalized)**						
	EB (Greenbelt Rd)	L	350	132	165	240	250
	EB (Greenbelt Rd)	TR	1,584	148	128	373	294
	WB (Greenbelt Rd)	L	200	43	126	68	137
	WB (Greenbelt Rd)	TR	1,336	598	324	208	296
	NB (60th Ave)	LTR	320	132	217	154	#357
	SB (Cherrywood Ln)	L	350	74	112	172	254
	SB (Cherrywood Ln)	LT	1,300	75	134	178	315
	SB (Cherrywood Ln)	R	1,300	252	259	653	529
2	**Cherrywood Lane & Breezewood Drive (AWSC)**						
	WB (Breezewood Dr)	LR	573	-	86	-	76
	NB (Cherrywood Ln)	T	1,300	-	120	-	162
	NB (Cherrywood Ln)	R	1,300	-	81	-	113
	SB (Cherrywood Ln)	L	175	-	57	-	65
	SB (Cherrywood Ln)	T	2,394	-	73	-	85
3	**Cherrywood Lane & Springhill Drive (TWSC)**						
	WB (Springhill Dr)	LR	620	-	90	-	189
	NB (Cherrywood Ln)	TR	2,394	-	-	-	3
	SB (Cherrywood Ln)	L	350	-	53	-	68
4	**Cherrywood Lane & Greenbelt Metro Drive (Roundabout)**						
	EB (Greenbelt Metro Dr)	L	449	-	59	-	109
	EB (Greenbelt Metro Dr)	R	250	-	25	-	43
	NB (Cherrywood Ln)	LT	111	-	92	-	107
	SB (Cherrywood Ln)	T	1,451	-	42	-	83
	SB (Cherrywood Ln)	R	200	-	13	-	10
5	**Cherrywood Lane & Ivy Lane (TWSC)**						
	EB (Cherrywood Ln)	LTR	1,451	-	156	-	45
	WB (Cherrywood Ln)	L	219	-	35	-	23
	WB (Cherrywood Ln)	TR	219	-	12	-	9
	NB (Ivy Ln)	LT	485	-	81	-	131
	NB (Ivy Ln)	R	485	-	38	-	53
	SB (Ivy Ln)	LTR	223	-	66	-	#287

Table 4-26: No-build Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
6	**Greenbelt Road (MD 193) & 62 Avenue/Beltway Plaza Driveway (Signalized)**						
	EB (Greenbelt Rd)	L	250	0	27	9	63
	EB (Greenbelt Rd)	TR	1,336	63	56	511	221
	WB (Greenbelt Rd)	L	250	9	53	19	123
	WB (Greenbelt Rd)	T	1,038	190	168	373	291
	WB (Greenbelt Rd)	R	1,038	0	39	3	96
	NB (62th Ave)	LTR	697	25	96	115	202
	SB (Beltway Plaza Drwy)	L	350	16	14	173	238
	SB (Beltway Plaza Drwy)	LT	472	17	69	172	268
	SB (Beltway Plaza Drwy)	R	350	0	23	0	51
7	**Kenilworth Avenue (MD 201) & I-95/I-495 SB Off-ramp (Signalized)**						
	EB (I-95/I-495 SB Off-ramp)	L	531	112	300	97	211
	EB (I-95/I-495 SB Off-ramp)	R	736	0	394	0	2
	NB (Kenilworth Ave)	T	1,263	46	90	66	116
	SB (Kenilworth Ave)	T	574	229	180	56	115
8	**Kenilworth Avenue (MD 201) & I-95/I-495 NB Off-ramp (Signalized)**						
	WB (I-95/I-495 NB Off-ramp)	L	885	223	245	160	222
	WB (I-95/I-495 NB Off-ramp)	R	835	217	152	61	96
	NB (Kenilworth Ave)	T	345	116	131	49	94
	SB (Kenilworth Ave)	T	199	56	154	77	129
9	**Kenilworth Avenue (MD 201) & Crescent Road/Maryland SHA Office (Signalized)**						
	EB (Maryland SHA Office)	LTR	250	1	36	3	48
	WB (Crescent Rd)	LT	441	168	254	79	145
	WB (Crescent Rd)	R	250	0	133	0	71
	NB (Kenilworth Ave)	L	250	28	85	9	36
	NB (Kenilworth Ave)	T	286	234	281	117	160
	NB (Kenilworth Ave)	R	250	9	114	2	35
	SB (Kenilworth Ave)	L	300	64	110	128	201
	SB (Kenilworth Ave)	T	793	45	156	60	446
	SB (Kenilworth Ave)	R	793	0	10	0	194
10	**Kenilworth Avenue (MD 201) & Ivy Lane (Signalized)**						
	EB (Ivy Ln)	R	-	0	-	0	-
	NB (Kenilworth Ave)	L	547	88	134	21	59
	NB (Kenilworth Ave)	T	-	45	64	29	-
	SB (Kenilworth Ave)	T	1,198	4	93	15	101
	SB (Kenilworth Ave)	R	-	0	-	0	-

Table 4-26: No-build Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
11	**Kenilworth Avenue/Edmonston Road (MD 201) & Cherrywood Lane (Signalized)**						
	EB (Cherrywood Ln)	L	777	68	120	129	165
	EB (Cherrywood Ln)	R	1,304	0	65	0	200
	NB (Kenilworth Ave)	L	750	81	367	18	148
	NB (Kenilworth Ave)	T	1,198	2	59	6	76
	SB (Edmonston Rd)	T	594	307	301	212	204
	SB (Edmonston Rd)	R	250	31	#265	0	89
12	**Edmonston Road (MD 201) & Sunnyside Avenue (Signalized)**						
	EB (Sunnyside Ave)	L	965	182	555	320	#1234
	EB (Sunnyside Ave)	R	350	332	#421	455	#425
	NB (Edmonston Rd)	L	450	362	387	268	#602
	NB (Edmonston Rd)	T	1,381	249	259	809	#1865
	SB (Edmonston Rd)	T	1,554	1336	#1629	1058	#1726
	SB (Edmonston Rd)	R	250	23	#293	14	#336
13	**Edmonston Road (MD 201) & Powder Mill Road (Signalized)**						
	EB (Powder Mill Rd)	L	250	43	124	414	237
	EB (Powder Mill Rd)	T	903	244	269	0	457
	EB (Powder Mill Rd)	R	500	0	83	0	154
	WB (Powder Mill Rd)	L	250	114	156	74	119
	WB (Powder Mill Rd)	T	699	176	214	129	163
	WB (Powder Mill Rd)	R	100	0	100	0	62
	NB (Edmonston Rd)	L	400	513	364	~615	324
	NB (Edmonston Rd)	T	640	274	246	19	297
	NB (Edmonston Rd)	R	275	0	20	64	96
	SB (Edmonston Rd)	L	275	21	104	0	140
	SB (Edmonston Rd)	TR	822	324	301	0	310
14	**Greenbelt Metro Drive & Site North Access (TWSC)** [a]						
	EB (Greenbelt Metro Dr)	T	-	N/A	N/A	N/A	N/A
	WB (Greenbelt Metro Dr)	L	-	N/A	N/A	N/A	N/A
	WB (Greenbelt Metro Dr)	T	-	N/A	N/A	N/A	N/A
	NB (Site North Access)	LR	-	N/A	N/A	N/A	N/A

Table 4-26: No-build Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
15	**Greenbelt Station Bus Bays/Greenbelt Metro Drive & Greenbelt Station Parkway (Signalized)**						
	EB (Greenbelt Sta Bus Bays)	LT	216	22	59	16	54
	EB (Greenbelt Sta Bus Bays)	R	-	-	-	-	-
	WB (Greenbelt Metro Dr)	L	366	412	#446	169	250
	WB (Greenbelt Metro Dr)	T	366	14	45	15	57
	WB (Greenbelt Metro Dr)	R	-	0	-	0	-
	NB (Greenbelt Sta Pkwy)	L	250	-	-	0	4
	NB (Greenbelt Sta Pkwy)	T	243	100	102	50	84
	NB (Greenbelt Sta Pkwy)	R	243	31	-	12	11
16	**Greenbelt Station Parkway & North Core Development/Site Northwest Access (Signalized)**						
	EB (North Core Dev)	L	178	38	80	121	164
	EB (North Core Dev)	TR	178	0	36	0	63
	NB (Greenbelt Sta Pkwy)	L	544	28	197	33	131
	NB (Greenbelt Sta Pkwy)	TR	544	28	107	67	228
	SB (Greenbelt Sta Pkwy)	TR	261	0	22	0	13
17	**Greenbelt Station Parkway & Residential Access to 500 Units (TWSC)**						
	EB (Residential Access)	R	174	-	59	-	49
	NB (Greenbelt Sta Pkwy)	T	465	-	3	-	302
18	**Greenbelt Station Parkway & I-95/I-495 Off-ramps/Site South Access/Kiss & Ride (Signalized)**						
	EB (I-95 Off-ramps)	L	229	238	223	187	134
	EB (I-95 Off-ramps)	LTR	229	129	222	21	153
	EB (Kiss and Ride)	L	188	229	#258	116	174
	WB (Site South Access)	R	407	6	27	118	160
	NB (Greenbelt Sta Pkwy)	L	375	24	59	35	76
	NB (Greenbelt Sta Pkwy)	T	530	325	86	110	87
	SB (Greenbelt Sta Pkwy)	L	400	0	120	0	54
	SB (Greenbelt Sta Pkwy)	TR	465	0	73	28	93
19	**Greenbelt Station Parkway & WMATA Garage (Signalized)**						
	EB (WMATA Garage)	L	150	7	30	100	#158
	EB (WMATA Garage)	R	290	0	24	0	63
	NB (Greenbelt Sta Pkwy)	LT	330	358	183	157	80
	NB (Greenbelt Sta Pkwy)	TR	330	4	145	48	99
	SB (Greenbelt Sta Pkwy)	T	162	141	68	248	152
	SB (Greenbelt Sta Pkwy)	R	162	23	14	0	2
20	**Greenbelt Station Parkway & Residential Access to 300 Units (TWSC)**						
	EB (Residential Access)	LR	224	-	64	-	44
	NB (Greenbelt Sta Pkwy)	LT	345	-	0	-	0
	SB (Greenbelt Sta Pkwy)	TR	350	-	5	-	6

Table 4-26: No-build Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
21	**Greenbelt Road (MD 193) & Greenbelt Station Parkway (Signalized)**						
	EB (Greenbelt Rd)	L	124	95	144	97	#142
	EB (Greenbelt Rd)	T	1,008	84	95	360	233
	WB (Greenbelt Rd)	T	1,584	117	130	165	199
	WB (Greenbelt Rd)	R	150	0	71	19	#167
	SB (Greenbelt Sta Pkwy)	L	524	115	162	125	185
	SB (Greenbelt Sta Pkwy)	R	225	165	209	184	#242

Notes:

~ 50th percentile volume exceeds capacity, queue is theoretically infinite.

95th percentile volume exceeds capacity, queue may be longer.

m Volume for 95th percentile queue is metered by upstream signal. Due to upstream metering, the 95th percentile queue may be less than the 50th percentile queue.

AWSC = All-way STOP-Controlled intersection

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left / through / right lanes

TWSC = Two-way STOP-Controlled intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

[a] Intersection would be included under the Build Condition, but was included as part of the No-build Condition design provided by Renard Development Company, LLC.

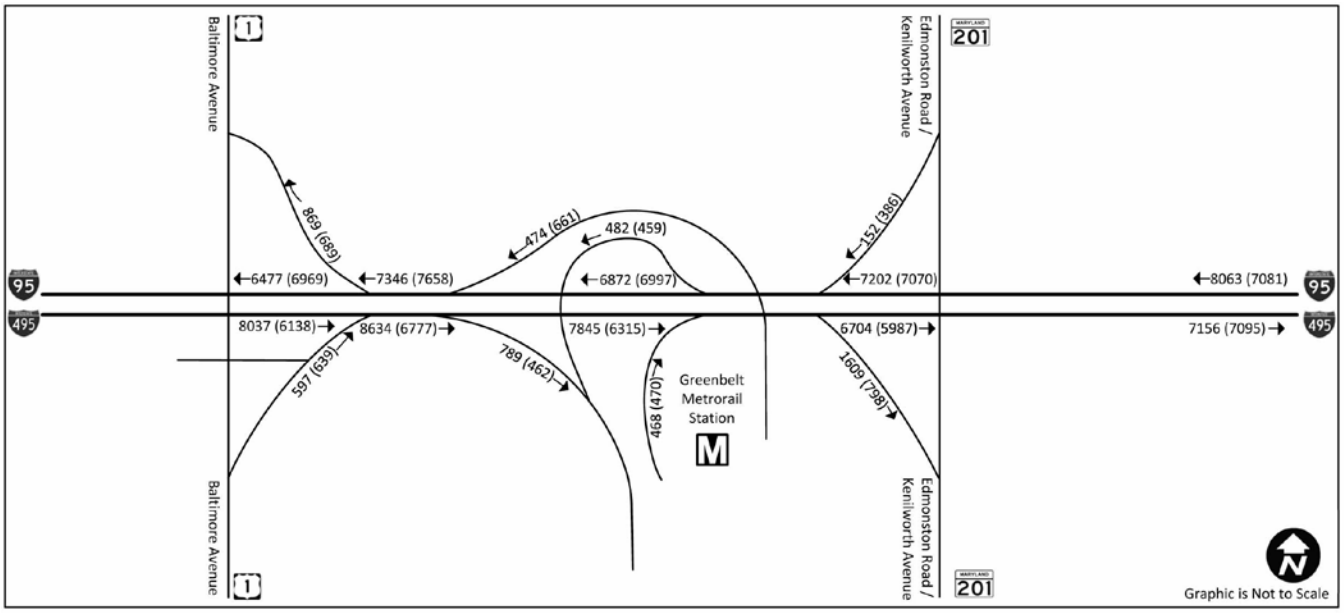
4.8.7.2 Overall Traffic Assessment

Overall, the PM peak hour would experience corridor-based delays along Edmonston Road (MD 201) in the northbound direction beginning at Powder Mill Road and extending to Cherrywood Lane resulting in indirect, long-term, major adverse impacts. There would also be isolated intersection impacts during the AM peak hour at the Edmonston Road and Sunnyside Avenue and during both peak hours at the Cherrywood Lane and Ivy Lane intersection (Ivy Lane approaches only) resulting in indirect, long-term, adverse impacts.

4.8.8 No-build Condition Freeway Volumes

Although freeway analysis was not performed for the No-build Condition, freeway ramp volumes are included in figure 4-16 to allow a comparison to the Existing Condition, Build, and Build with Mitigation Condition freeway ramp volumes presented in Sections 3.7, 5.8, and 6.6, respectively. Full analysis of the freeway volumes is included in the Build with Mitigation Condition, in Section 6.6.

Figure 4-16: No-build Condition Freeway Volumes



5.0 Analysis of Build Condition

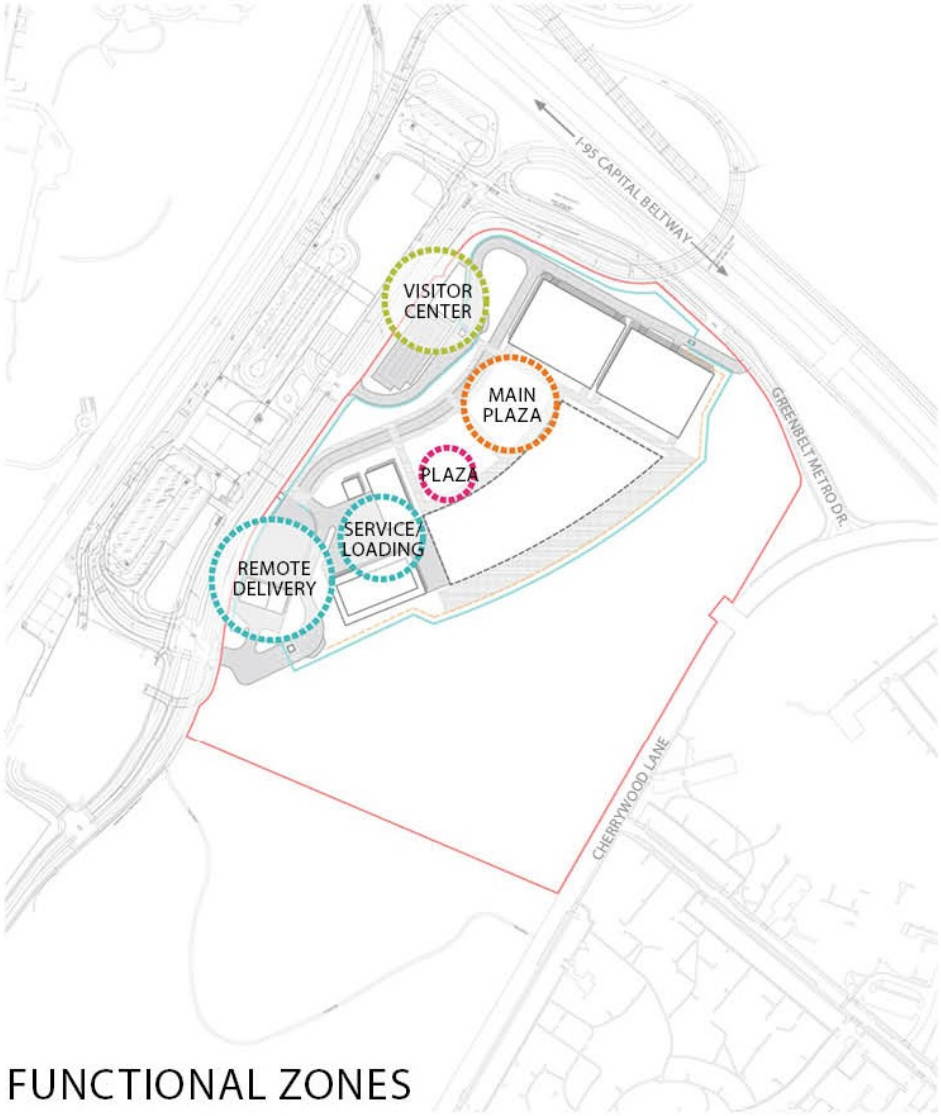
This chapter introduces the Build Condition for the Greenbelt site and summarizes the potential impacts to the pedestrian network, bicycle network, public transit system, parking conditions, truck access, and traffic operations.

Under the Build Condition, GSA would not continue to maintain the FBI HQ building in Washington, D.C., and the Greenbelt site would be selected. The Greenbelt Build Condition is unique from the proposed action described in the FBI HQ Consolidation DEIS because it only analyzes the conditions at the Greenbelt site and does not factor in the impacts from the exchange of the JEH parcel in Washington, D.C.

5.1 Description of Build Condition

Consolidation of the FBI HQ at Greenbelt would include a Main Building or series of buildings of approximately 2.4 million GSF. The main HQ building would house the majority of the approximately 11,000 employees, plus approximately 400 non-seated contractors, such as custodial staff and food service workers. The Main Building would include general office space, collaborative workspaces, the Mission Briefing Center and auditorium (to be used for training and large meetings), a cafeteria/food court, retail spaces, fitness center, credit union, and medical clinic. The building(s) also would include support spaces such as loading docks, workshops, and police/security spaces. In addition to the Main Building, the site would contain plaza areas, parking areas, a Central Utility Plant (CUP), a Remote Delivery Facility (RDF) and truck access, a Visitor Center (VC), and gate and access points. The location of some of these elements is shown in figure 5-1.

Figure 5-1: Greenbelt Site Organization



The remote delivery zone, which would contain the truck screening facility and the RDF, would be located in the southwestern corner of the site, with trucks accessing the site from the Capital Beltway and Greenbelt Station Drive at the southern gate. Adjacent to this zone would be the service and loading zone, located east of the remote delivery zone and adjacent to the southern end of the Main Building. This zone would contain the CUP, stand-by generators, and substation, and would provide access to the Main Building for loading and maintenance. The 4.0-acre developable area for the Main Building would be located in the center of the site, with the southeastern edge of the building aligning with the edge of the existing parking and Capital Beltway ramps. Based on the size and configuration of the developable area, the planning team determined that the Main Building would be up to 17 stories tall. The developable area in front of the Main Building would form the plaza zone. This zone would provide a pedestrian-oriented open space for employees and visitors, as well as a stage for a primary entrance to the Main Building. The visitor zone would be located near the northwestern corner of the site, adjacent to the main gate. It would contain the VC, visitor parking, and bus drop-off. The visitor parking lot would accommodate up to 135 spaces.

Access to the site would be provided primarily along the extension of Greenbelt Station Parkway, the north-south oriented roadway connecting North and South Cores, as shown in figure 5-2. The preliminary conceptual site plan contains three vehicular entry control facilities (ECFs): Note that other resources topics in the EIS based their impact assessment on the revised conceptual site plan describe in the Build with Mitigation (Section 6).

- South Access: This ECF, located along Greenbelt Station Parkway, would contain three lanes, two for inbound employee vehicular traffic only and one for access to the RDF. This ECF would also provide the only access point for truck traffic during non-peak hours. No outbound traffic would be allowed through this gate. A separate exit driveway would be provided from the RDF to Greenbelt Station Parkway to provide a truck exit.

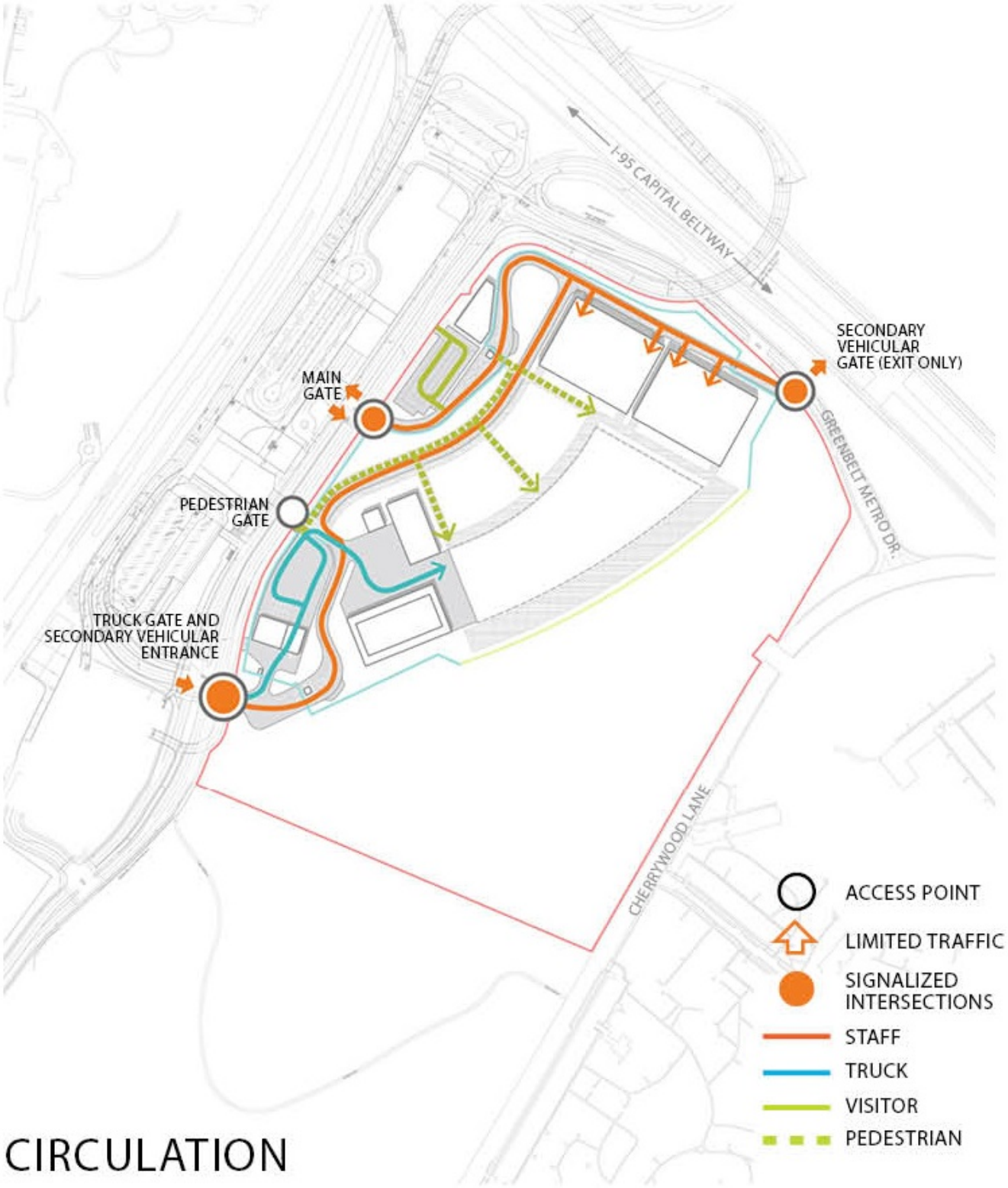
- Northwest Access: This ECF, located along Greenbelt Station Parkway, would contain three lanes for employee vehicular traffic. Employee vehicles would enter the site through two inbound lanes during the AM peak period, and one lane at all other times. Employee vehicles would exit the site through one inbound lane during the AM peak period, and two lanes at all other times.

- North Access: This ECF, located along Greenbelt Metro Drive, would contain three lanes for outbound employee vehicular traffic only. No inbound traffic would be allowed through this gate.

Visitor vehicular traffic would access the site through the visitors' parking lot located along Greenbelt Station Parkway. Visitor pedestrian traffic would enter the site through the VC, adjacent to the visitor parking lot, while employee pedestrian traffic would access the site through a separate pedestrian gate with a direct connection to the Greenbelt Metro Station.

Employee parking garages would be located to the north of the Main Building developable area and adjacent to the northern site boundary. In the conceptual site layout analyzed in the EIS, these spaces would be accommodated in two, eight-story parking structures. The FBI is conducting an internal analysis to support a final determination of the total amount of employee parking for this site. If the final number of employee parking spaces is substantially higher than what is assumed in this analysis, additional NEPA analyses would be conducted. The configuration and layout of the parking structures to accommodate the required employee and fleet vehicle parking would be determined during the design process.

Figure 5-2: Greenbelt Site Circulation



The Greenbelt Build Condition includes the following transportation improvements that would be necessary for the site to function based on the magnitude of trips forecasted to occur:

The key components of the Springfield Build Condition are as follows:

- ADA accessibility and sidewalk and pedestrian access improvements would be made as needed at entry locations, as well as to connect to the sidewalk network.
- No offsite bicycle improvements are included as part of the Build Condition. Bicycle improvements such as bicycle parking and showers or locker rooms may be provided as part of the final design, but are not yet known at this time.
- No shuttle service is proposed as part of the Build Condition, because the Greenbelt site is within a 0.5-mile walk of the nearest transit station.
- All parking supporting the Build Condition would be accommodated onsite. In the conceptual site layout analyzed in the EIS, these spaces would be accommodated in two, eight-story parking structures.
- Truck access would be provided at the South ECF; trucks would be required to access the facility at off-peak hours.
- Four entry driveways leading to ECF facilities would be developed as part of the site. These include a south access from Greenbelt Station Parkway (three-lane entry only, as well as the only truck access location), a truck exit only driveway (one lane) from the RDF to Greenbelt Station Parkway, a northwest access to/from Greenbelt Station Parkway (three-lanes: two inbound, one outbound during AM peak; two outbound, one inbound at all other times), and a north access to Greenbelt Metro Drive (three-lane exit only).

The Greenbelt Build Condition includes the following transportation improvements that would be necessary for the site to function based on the magnitude of trips forecasted. These improvements are mitigation measures, discussed in Section 6, but they are also included in the Build Condition to accommodate trip volumes.

- Greenbelt Metro Drive and site north access (exit only): A traffic signal would be installed at the intersection.
- The traffic signal timing along Greenbelt Station Parkway would be updated by optimizing the timings based on the forecasted FBI vehicle trips and the signals would be coordinated.

The trip generation and modal split assumptions are discussed first, followed by a discussion for each transportation mode.

5.2 Trip Generation and Mode Split

This section covers the trip generation and modal split process and methods used to develop the Build Condition transit and traffic trip volumes.

5.2.1 Trip Generation

The process of trip generation calculation is based on forecasting the number of AM and PM peak hour trips generated by the proposed development. There are several proposed trip generators for the site including an estimated 11,055 FBI employees, a 500-seat Mission Briefing Center, and a fleet of pool cars, according to the FBI. Based on an estimate for commuter-based pool car use, there would be less than five trips produced. It is also assumed that the approximately 400 non-seated contractors providing custodial, food, fitness center, health, and other services would travel outside the peak hours. Therefore, no trips were added to the trip generation calculation for commuter-based pool car use or non-seated contractors. The process for forecasting the FBI employee and Mission Briefing trips is discussed next.

5.2.1.1 FBI Employee Person Trips

Many employees choose to or are scheduled to begin or end work earlier or later than the peak hours to avoid traffic, to schedule shared childcare responsibilities, to take advantage of quiet time at work, and for other reasons. The ITE *Trip Generation Manual*, *9th Edition,* identifies estimates for peak hour trip generation rates for different types of office buildings based on various studies; however, most of these studies are in suburban rather than urban environments, "having little or no transit service, nearby pedestrian amenities, or travel demand management (TDM) programs" (ITE 2012). In addition, FBI employee patterns of arrivals and departures, including the number of employees who will be off-site or on field work at any given time is not typical of most office uses. For these reasons, it was determined that the future FBI trip generation rate is not accurately represented by the ITE *Trip Generation Manual*; therefore, a special study was undertaken to determine appropriate trip generation rates using the current FBI HQ, which houses more than 50 percent of staff. As stated in the Trip Generation Manual, "when practical, the user is encouraged to supplement the data in this document with local data that have been collected at similar sites" (ITE 2012).

Morning peak hour rates were calculated based on FBI turnstile counts obtained from the FBI representing all persons entering the JEH building (current FBI HQ). Following the guidance of the ITE *Trip Generation Handbook, 2nd edition* (ITE 2004), three days of turnstile counts (November 12, 2013 [Tuesday], December 4, 2013 [Wednesday], and January 9, 2014 [Thursday]) were obtained. The sample days for normal operations days were selected by the FBI. The survey results produced a peak hour count of 1,344 on November 12, 2013, 1,361 on December 4, 2013, and 1,324 on January 9, 2014, and a peak hour of 7:15 AM to 8:15 AM. To provide a more conservative forecast, the maximum count from the 3-day turnstile counts (1,361) was used, instead of the average. The turnstile counts only represent the inbound flows, but most organizations have two-way flows of workers, even in peak hours. Therefore the ITE *Trip Generation Manual* Corporate Headquarters land use entering/exiting percentages (AM: 93 percent entering / 7 percent exiting) were used to calculate the morning outbound peak hour flow, based on the maximum count from the survey results. The total person trips (entering and exiting) divided by 5,045 (current number of FBI employees working at the JEH building) was used to develop the AM peak hour rate, which resulted in a 0.29 person trip rate (29.0 percent of employees arrive or leave during the AM peak hour).

Afternoon peak hour rates were calculated based on a JEH building exit-only trip generation survey. Following the ITE guidance (ITE 2004), the trip generation survey was conducted for three days (September 16, 17, and 18, 2014) on a non-holiday week resulting in outgoing trip volumes of 1,174, 1,259, and 1,130, respectively. Based on the PM peak hour occurring between 4:30 PM and 5:30 PM, the PM rate was calculated from the trip generation survey (outbound flow) and the inbound turnstile counts from the inbound survey days.

Based on the turnstile volumes, the highest number of employees entering during the 4:30 to 5:30 PM time slot was 114. The average for the time slot was 73, higher than both the other days' values (68 and 36 respectively) for the same one-hour period. This meant that the 114 value was skewing the values when averaged and was not a good representation of a typical evening inbound flow. Therefore, the next 15-minute slot for an hourly average (4:45 PM-5:45 PM) was examined. The average of the 4:45 PM to 5:45 PM time slot equals the average of the 3 days for the 4:30 to 5:30 PM time slot, and therefore appears to be more typical of a normal operation. To follow the same process as the inbound flow, the highest value of this time slot was used, for a value of 98. Since the values for the inbound PM flows fluctuated between days and one day seemed to at least double the other two, the percent entering and exiting was adjusted to model the outbound flows in a more conservative manner. The calculated split was 7 percent inbound and 93 percent outbound. Instead the split was rounded down and up to a 5 percent inbound and 95 percent outbound split. The outbound split has the greatest impact on traffic; therefore a higher outbound split percentage is more conservative (worse case) than a lower outbound split.

This resulted in a 0.269 person PM peak hour trip rate (26.9 percent of employees arrive or leave during the PM peak hour) where 5 percent entered and 95 percent exited the JEH building based on the 5,045 existing employees working at the JEH building. Table 5-1 summarizes the JEH building trip generation rates.

Table 5-1: J. Edgar Hoover Building Existing Peak Hour Person Trips

Source	Independent Variable	Time Period	IN	OUT	TOTAL
Turnstiles (11/12/13, 12/4/13, and 1/9/14) Survey (9/16/14 - 9/18/14)	5,045 employees	AM Peak Hour	1,361	102	1,463
		PM Peak Hour	98	1,259	1,357
Existing number of employees at JEH building		5,045			
AM peak hour trip generation rate		0.290			
PM peak hour trip generation rate		0.269			

5.2.1.2 Mission Briefing Center

The Briefing Center is assumed to have 500 seats, according to the FBI. It is assumed that half (50 percent) of the facility capacity would arrive from offsite and that half would be onsite (walk) trips. The ITE *Trip Generation Manual* does not contain a "Conference Center" land use; therefore, the study followed the trip rates used by the traffic study for the Washington Convention Center published in the Old Post Office (OPO) Redevelopment Transportation Study (GSA in cooperation with NCPC 2013). The AM peak inbound trip generation rate reported by the OPO study was 0.36; the PM peak outbound trip rate was 0.29, assuming that 100 percent would be inbound in the AM peak and 100 percent outbound in the PM peak.

5.2.1.3 Total Site Forecasted Person Trips

The person trip generation representing the total number of estimated employees at the new site used the trip rates calculated through the JEH building trip generation study. The Mission Briefing Center uses the person trip generation rates provided by the OPO Redevelopment Transportation Study. Table 5-2 contains the Landover site forecasted person trip generation and trip generation assumptions.

Table 5-2: Landover Site Forecasted Trip Generation

Future FBI Person Trips	Time Period	Enter/Exit Percentages		Proportion of Trips during the Peak Hour	Future Employee Person Trips		
		IN	OUT		IN	OUT	TOTAL
Employees (based on JEH Turnstile Counts and Surveys)							
11,055	AM Peak Hour	93%	7%	29%	2,982	224	3,206
	PM Peak Hour	5%	95%	26.9%	149	2,825	2,974
Briefing Center (based on the Old Post Office Redevelopment Transportation Study)							
250	AM Peak Hour	100%	--	36%	90	--	90
	PM Peak Hour	--	100%	29%	--	73	73
Total People							
11,305	AM Peak Hour	--	--	--	3,072	224	3,296
	PM Peak Hour	--	--	--	149	2,898	3,046

5.2.2 Modal Split

Modal split is calculated by apportioning person trips to the available transportation modes used to commute. The process begins with calculating the split for carpools/vanpools, followed by single-occupancy vehicles (SOV), and

then works systematically through the other modes. Employees and the Mission Briefing visitors are evaluated separately.

5.2.2.1 Employee Mode Split

Carpool/Vanpool: The number of vehicles is highly dependent on the number of parking spaces available. According to the NCPC Comprehensive Plan Transportation Element (NCPC 2004), the number of parking spaces for a suburban site within 2,000 feet of a Metrorail station is determined by a ratio of one parking space for every three employees, a ratio of 1:3. As the site is projected to have 11,055 employees, the number of parking spaces is therefore assumed to be 3,685***. It should be noted that this number does not reflect the non-seated workers, visitors, and pool fleet, which will require additional parking spaces and will not be subject to NCPC parking policy.*** Based on information from NCPC and project knowledge of carpool/ vanpool mode split at other large Federal sites, the carpool/vanpool mode split was initially estimated at approximately 8 percent. Given the proximity to the Capital Beltway; limited parking at suburban Metrorail stations, long trip times when driving, parking, and using Metrorail; vanpool incentive programs likely including reserved and/or preferred parking spaces for carpools and vanpools; and that onsite Transportation Demand Management programs would likely include a ridematching customized for FBI employees, this initial estimate of carpool/vanpool trips was increased to 11 percent of employees, or 1,216 persons. This is consistent with the carpool/vanpool mode split for several other Federal sites in the region. Based on the Greenbelt Site Transportation Agreement, the average vehicle occupancy would be three persons resulting in 405 vehicle trips. By extension, this removes 405 parking spaces from SOV availability into potentially reserved parking spaces for carpools/ vanpools.

Single-Occupancy Vehicles: The number of SOVs is highly dependent on the number of parking spaces available. After 405 spaces are removed for carpool/vanpool, this leaves 3,280 SOV parking spaces at the site; a 29.7 percent SOV mode share. The FBI and GSA, through the application of a Transportation Management Plan, would implement policies and actions to deter any offsite parking using the proposed new WMATA garage serving the Greenbelt Metro Station. This can be accomplished through aggressive monitoring and punitive actions.

Bicycle: Given the suburban nature of the site, it is assumed that 2 percent of the employees, or 221 people, would bicycle to the site, consistent with the MWCOG *2013 State of the Commute* (MWCOG 2011).

Walk: Given the predominance of low-density single-family residential and open space within walking distance, it is assumed that the walk mode split would be 1 percent of employees, or 110 people. Future residential development in the surrounding area, in line with the vision of the Comprehensive Plan may eventually increase this percentage. Based on existing conditions, 1 percent is the conservative mode split assumption for this site.

Commuter Bus: It is likely that MTA would develop commuter bus service the Greenbelt site because it already has 37 daily runs operating in this area. Commuter buses provide an effective option for long-distance commuters whose schedules may vary from day to day, and who appreciate the flexibility of various arrival and departure times. Commuter buses provide fixed route service that may collect from neighborhoods as well as Park & Ride lots, and distribute riders to varied destinations along high-employment corridors. A 3 percent mode share for commuter bus, equivalent to 332 persons, is estimated for this site due to the factors noted above. It is expected that commuter bus providers would implement new services to meet the demand of employees commuting to this site providing service from Park & Ride locations throughout Maryland directly to the site. Employees in Virginia would likely use other commuter bus services already operating in Virginia to reach Metrorail service in Virginia and DC; they are captured in the Metrorail mode split.

Local Bus: 15 local bus routes directly serve the site, including three operated by Prince George's County and 12 operated by WMATA Metrobus. One regional bus route operated by Central Maryland Regional Transit (CMRT) also serves the site. These buses serve six Metrorail stations on the Green/Yellow, Orange, and Red lines. Together, the local buses cover an area that spans from Wheaton to the northwest to New Carrollton in the

southeast. Consequently, local bus service has a large capture area around the site. Additionally, with limited onsite parking availability, some employees would choose to drive to a location near the site then use local bus for the final leg. However, these factors would be offset by infrequent headways and sometimes circuitous routes potential employees may experience using these services. Nevertheless, it is assumed that 6 percent of employees, or 663 persons, would use local bus service.

Metro/MARC: Once the data points and assumptions for other modes were applied and the number of employees assigned to each was calculated, it is assumed that the remaining employees would travel to/from the site via Metrorail or MARC, by way of the Greenbelt Metro/MARC Station, located adjacent to the site. The sum of all other modes equals 5,822 trips, leaving 5,233 trips, or 47.33 percent of the total, to be made by Metro/MARC. The results of the 2013 Mark Center Transportation/Commuter Survey Report showed 48 percent of employees used public transit in 2013, a trip that requires transferring to a bus at either the Pentagon Metro Station or King Street Metro Station to reach the Mark Center site (City of Alexandria 2014). These results are relevant because it is a large Federal worksite with limited onsite parking and illustrates that a large percentage of employees would use transit when parking is not available. This is higher than the 33 percent reported by NCPC for Federal Employees region-wide (NCPC 2011). However, it is reasonable given the proximity of the site to the Greenbelt Metro Station, and given the expected parking ratio of 1:3 (one space for every three employees) resulting in only 3,280 SOV parking spaces for 11,055 employees.

Table 5-3 summarizes the relevant modal split information sources and percentages referenced in the discussion above.

Table 5-3: Modal Split Summary of Sources

Mode	MWCOG 2020 Percent by Mode for TAZ 897 [a]	MWCOG 2013 State of the Commute [b]	2011 NCPC [c] Federal Employee Commuting Patterns (2008)
Single-Occupancy Vehicles	75.5%	71.5%	54%
Carpool/ Vanpool	12.1%	7.3%	8%
Bicycle	NA	2.4%	2%
Walk	0.0%		3%
Commuter Bus	NA	NA	NA
Local Bus	6.5%	18.8%	33%
Metrorail/ Commuter Rail	5.9%		
Telework/ Compressed Work Schedules	NA	NA	NA
Total	**100%**	**100%**	**100%**

NA = Not Applicable. Percentages do not always equal 100 percent due to unreported modes and/or rounding.

[a] Represents the forecasted 2020 modal split based on a forecast of more than 3,200 total jobs within the MWCOG travel demand model traffic analysis zone (TAZ) 897 located along Cherrywood Lane on the other side of I-95/I-495 (proposed site (TAZ 895) is forecasted for less than 25 total job, thus TAZ 897 is a better sample) (MWCOG 2014a).

[b] MWCOG (2011; 2013)

[c] NCPC (2012)

Table 5-4 summarizes the FBI mode split, as discussed above, and provides the resulting trips by mode.

Table 5-4: FBI Modal Split Summary Results

Mode	FBI Development Percent by Mode	FBI Number of trips by Mode
Single-Occupancy Vehicles	29.7%	3,280
Carpool/ Vanpool	11%	405 trips [a] (1,216 persons)
Bicycle	2%	221
Walk	1%	110
Commuter Bus	3%	11 trips [b] (332 persons)
Local Bus	6%	663
Metrorail/ Commuter Rail	47.33%	5,233
Telework/ Compressed Work Schedules	0%	0
Total	**100%**	**11,055**

[a] Assumes an average occupancy of three persons per carpool//vanpool and equates to 405 vehicle trips.
[b] Assumes an average of 30 persons per commuter bus; 332 people equates to 11 buses.

5.3 Pedestrian Network

Under the Build Condition, because the roadways adjacent to the Greenbelt site would already have sidewalks due to the Greenbelt Station development proposal, only localized pedestrian improvements are anticipated at the locations of the remaining ECFs to provide ADA compliance and pedestrian access, as needed. Within the site, multiple pedestrian pathways would provide access to the Main Building and between elements on the site; the exact location of these pedestrian accommodations would be determined in the final site design process.

Based on the anticipated mode split percentages, a large number of pedestrians would access the Greenbelt site via the surrounding pedestrian network. The large increase in pedestrians would be related to the location of the Greenbelt site (within a 0.5-mile walking distance of several transit options) and because reduced parking was designed per NCPC guidance to encourage employees to access the site via transit. It is anticipated that most transit riders would follow sidewalks or the proposed direct connection between the Greenbelt Metro Station and the pedestrian gate at the western edge of the Greenbelt site. The direct pedestrian connection between the Greenbelt Metro Station and the Greenbelt site would not enter the FBI security perimeter. These sidewalks or the connection would be built with future roadways planned in the No-build Condition.

Therefore, due to the large increase in pedestrians expected to access the site on foot via the pedestrian network, the Build Condition as planned would have direct, long-term, beneficial impacts to the pedestrian network. The pedestrian impacts would overall be beneficial, rather than adverse, because the sidewalks would be designed for the large number of pedestrians anticipated, the sidewalks or direct pedestrian connection would create a safe convenient travel route for pedestrians, and the sidewalk improvements at the ECFs would reduce barriers to accessing the site.

Because there is a plan under the No-build Condition to remove the existing sidewalks serving the Greenbelt Metro Station and construct a new network of sidewalks on both sides of Greenbelt Station Parkway, there would be no measurable direct construction impacts to the pedestrian network. However, there would be direct, short-term, adverse impacts to the proposed pedestrian network during construction if the proposed sidewalks along Greenbelt Station Parkway are constructed before the start of the Greenbelt site construction as a result of construction vehicles crossing the sidewalk and intermittent sidewalk closures.

5.4 Bicycle Network

As noted in the No-build Condition Bicycle Network section (Section 4.4), the Prince George's County Bicycle Master Plan (included in the *Approved Countywide Master Plan of Transportation* [M-NCPPC 2009]) recommends several bicycle facilities within the Greenbelt study area. Because there is no dated implementation plan in the Master Plan, it is unknown whether any of these recommendations would be completed by 2022. However, the bicycle improvements adjacent to roadways and proposed as part of development of the North Core should be complete by 2022. Development of the Build Condition would possibly limit the extent of the proposed mixed-use trail, shown in Section 4.4, on the Greenbelt site. Due to substantial improvements planned with the North Core development, no offsite bicycle improvements are planned as part of the Greenbelt Build Condition.

The overall bicycle mode split to the site is projected to be 2.0 percent, resulting in approximately 226 bicycle roundtrips daily. It is assumed that there would be bicycle facilities onsite to encourage the use of the bicycle mode of travel. Section 5.2 includes more information on modal splits for the Greenbelt Build Condition.

The increase in bicycle trips from the Greenbelt Build Condition would increase overall bicycle volumes in the study area. Given the existing bicycle facilities that serve the site and the study area (including those along Cherrywood Lane and Rhode Island Avenue [U.S. Route 1]) and those expected through development of the North Core (Greenbelt Station Parkway and others), the increase in projected bicycle volumes would have no measurable direct, long-term impact on the study area bicycle network.

Because there is a plan under the No-build Condition to revise the existing multi-use path serving the Greenbelt Metro Station via Greenbelt Metro Drive and construct a new network of bicycle lanes along Greenbelt Station Parkway and Greenbelt Metro Drive, there would be no measurable direct, short-term impacts to the bicycle network during construction of the Build Condition. However, there would be direct, short-term, adverse construction impacts to the proposed bicycle network if the proposed bicycle lanes along Greenbelt Station Parkway and Greenbelt Metro Drive are constructed before the start of the Greenbelt site construction as a result of construction vehicles crossing the lanes and intermittent lane closures.

5.5 Public Transit

The following sections describe the Build Condition for the bus and Metrorail modes within the Greenbelt study area. Similar to the No-build Condition analysis, commuter rail, commuter bus, carsharing, slugging, and private shuttles are not evaluated for the Build Condition because future ridership information or planning documents were not available. It is anticipated that there would be an increase in people commuting to the site via commuter bus or shuttle given the overall increase in total trips in the Build Condition.

5.5.1 Projected Trips

The projected person trips are explained in the Trip Generation and Modal Split section (see Section 5.2).

5.5.2 Metrorail Analysis

The Metrorail analysis was conducted using projected 2022 No-build Condition ridership and the additional passenger trips associated with the Greenbelt Build Condition. The Greenbelt Build Condition passenger trips were assigned to Metrorail peak hours using the Metrorail/commuter rail mode split of 47.33 percent, and a further reduction of passenger trips to account for passengers who could use MARC trains instead of Metrorail to access the site. MARC service operates in both directions to the Greenbelt Metro Station on weekdays. The MARC passenger trip reduction was calculated using the 2014 proportion of daily passengers that use MARC instead of Metrorail to and from the station, as shown in table 5-5.

Table 5-5: Greenbelt MARC/Metrorail Station Weekday Ridership Proportions

Greenbelt Station	Average Weekday Entries	
	Total	Percent of Total
MARC	63	1.0%
Metrorail	6,098	99.0%
Total	**6,161**	**100.0%**

Sources: WMATA (2014g); (2014e); MTA (2015b)

Overall, with a Metrorail/commuter rail mode split of 47.33 percent and the MARC passenger reduction (minus one percent), a total of 1,544 additional AM peak hour passenger trips and 1,427 additional PM peak hour passenger trips are projected. Table 5-6 summarizes the additional Metrorail trips associated with the Greenbelt Build Condition.

Table 5-6: Greenbelt Build Condition Additional Peak Hour Metrorail Passenger Trips

Employees	Time Period	IN	OUT	Proportion of Daily Total	Rail Mode Split	Metro Percent [a]	IN	OUT	TOTAL
11,055	AM Peak Hour	93%	7%	29%	47.33%	99.0%	1,397	105	1,502
	PM Peak Hour	5%	95%	26.9%	47.33%	99.0%	70	1,323	1,393
Briefing Center	**Time Period**	**IN**	**OUT**	**Proportion of Daily Total**	**Rail Mode Split**	**Metro Percent [a]**	**IN**	**OUT**	**TOTAL**
250	AM Peak Hour	100%	-	36%	47.33%	99.0%	42	-	42
	PM Peak Hour	-	100%	29%	47.33%	99.0%	-	34	34
Total People	**Time Period**						**Exits**	**Entries**	**Total**
11,305	**AM Peak Hour**						**1,439**	**105**	**1,544**
	PM Peak Hour						**70**	**1,357**	**1,427**

[a] These figures represent the percentage of passengers who would use Metrorail instead of MARC, and constitute the "MARC Reduction" previously referenced.

Sources: Greenbelt Site Transportation Agreement (Appendix C1)

The additional peak hour Metrorail passenger trips were further disaggregated into AM and PM peak 15-minute periods using existing PHF at the Greenbelt Metro Station. Overall, this resulted in an additional 428 passenger trips during the AM peak 15-minute period and an additional 400 passenger trips during the PM peak 15-minute period, as summarized in table 5-7.

Table 5-7: Greenbelt Build Condition Additional Peak 15-Minute Metrorail Passenger Trips

Employees	Time Period	IN	OUT	TOTAL	Peak Hour Factor	Time Period	IN	OUT	TOTAL
11,055	AM Peak Hour	1,397	105	1,502	27.7%	AM Peak 15-Minute	387	29	416
	PM Peak Hour	70	1,323	1,393	28.0%	PM Peak 15-Minute	19	371	390
Briefing Center	**Time Period**	**IN**	**OUT**	**TOTAL**	**Peak Hour Factor**	**Time Period**	**IN**	**OUT**	**TOTAL**
250	AM Peak Hour	42	-	42	27.7%	AM Peak 15-Minute	12	--	12
	PM Peak Hour	-	34	34	28.0%	PM Peak 15-Minute	--	10	10
Total People	**Time Period**	**Exits**	**Entries**	**TOTAL**	**Peak Hour Factor**	**Time Period**	**Exits**	**Entries**	**TOTAL**
11,305	**AM Peak Hour**	**1,439**	**105**	**1,544**	**27.7%**	**AM Peak 15-Minute**	**399**	**29**	**428**
	PM Peak Hour	**70**	**1,357**	**1,427**	**28.0%**	**PM Peak 15-Minute**	**20**	**380**	**400**

Sources: Greenbelt Site Transportation Agreement (Appendix C4); WMATA (2014g); WMATA (2014e)

Overall, the Greenbelt Build Condition would result in an additional 5,296 weekday entries at the Greenbelt Metro Station, bringing the weekday station entry total to 12,752 passengers (see table 5-8). Average weekday exits would theoretically be the same or similar to the average weekday entries.

Table 5-8: Weekday 2022 Projected Metrorail Ridership at Greenbelt

Metro Station	Average Weekday Entries					
	2014	2022 Background Growth	2022 Planned Development Projects	2022 Total No-build	2022 Additional Greenbelt Build Trips	2022 Total Greenbelt Build Trips
Greenbelt	6,098	7,185	271	7,456	5,296	12,752

Source: WMATA (2014g); WMATA (2014e); MWCOG (2015); Greenbelt Site Transportation Agreement (Appendix C1)

5.5.2.1 Metrorail Passenger Loads

Metrorail passenger loads at the Greenbelt Metro Station were calculated based on projected 2022 No-Build Condition ridership (background growth plus planned development passenger trips) plus the additional Greenbelt Build Condition passenger trips disaggregated to peak 15-minute periods. Because Greenbelt is a terminal station, passenger loads are equal to the total number of exiting passengers per train in the outbound direction (trains ending at the station) or the total number of entering passengers per train in the inbound direction (trains beginning at the station). Inbound entering passengers during the PM peak period were the highest overall; therefore, PM peak 15-minute entries were used for this analysis.

No expansion of WMATA's current Metrorail fleet was assumed for this analysis to provide the most conservative estimate of potential capacity issues. The Momentum Plan does call for all eight-car trains on all lines during peak periods by the year 2020; however, this would require significant upgrades to electrical systems and a significant expansion of WMATA's current fleet of railcars (WMATA 2014g). All trains were assumed to have six cars with the exception of Blue line trains, which typically have eight during peak periods (WMATA 2014h).

WMATA has three thresholds for railcar occupancy: less than 100 passengers per car (acceptable), between 100 and 120 passengers per car (crowded), and greater than 120 passenger per car (extremely crowded). Capacity is generally considered to be 120 passengers per car. Projected passenger loads under future development conditions at the station are well below 100 passengers per car, and therefore would be considered acceptable. Table 5-9 summarizes passenger loads per car under future development conditions using PM peak 15-minute exits.

Table 5-9: Greenbelt Build Condition Peak Metrorail Passenger Loads

Measure (PM Peak 15-Minute Entries)	Unit
2014 Maximum Passengers	55
2022 Passengers with Background Growth	65
2022 Passengers with Development Projects	44
2022 Total No-build Passengers	109
2022 Minimum Trains[a]	3
2022 Train Cars[b]	18
2022 Total No-build Passengers Per Car	6
2022 Greenbelt Build Additional Passengers	380
2022 Total Greenbelt Build Passengers	489
2022 Total Greenbelt Build Passengers Per Car	**27**

[a] A 4-minute headway equates to 3.75 trains every 15 minutes. This figure was rounded down to 3 minutes in order to provide the most conservative load estimate.
[b] Assumes all six car trains to provide the most conservative estimate.
Source: WMATA (2014e); WMATA (2014g); MWCOG (2015); Greenbelt Site Transportation Agreement (Appendix C1)

5.5.2.2 Station Capacity Analysis

A capacity analysis was conducted for the vertical elements (escalators and stairs), faregate aisles, fare vending machines, and platforms at the Greenbelt Metro Station. The analysis used 2022 Greenbelt Build Condition peak 15-minute periods of ridership (entries and exits) at the station (see table 5-7).

Volume-to-capacity (v/c) ratios were calculated for the vertical elements and fare elements, and pedestrian LOS was calculated for the platform area. Analysis for vertical elements and faregate aisles used projected ridership from the peak exiting period at the station –the time period when the highest total number of passengers would use each element. Table 5-10 summarizes ridership during the peak exiting period at the Greenbelt Metro Station.

Table 5-10: Greenbelt Build Condition Weekday Peak 15-Minute Entering and Exiting Period Ridership

Metro Station	Time	2014		2022 No-build		2022 Greenbelt Build	
		Entries	Exits	Entries	Exits	Entries	Exits
Greenbelt	5:00 PM – 5:15 PM	55	353	109	456	489	476

Source: WMATA (2014e); WMATA (2014g); MWCOG (2015); Greenbelt Site Transportation Agreement (Appendix C1)

The platform area analysis and fare vending machine analysis used projected Greenbelt Build Condition ridership from the peak entering period at the station – the time period when the highest number of passengers would likely use fare vending machines and the highest number of passengers would be waiting on the platform. With the introduction of the Build Condition passengers, the peak 15-minute entering period at the Greenbelt Metro Station shifts from the 7:15 AM to 7:30 AM period to the 5:00 PM to 5:15 PM period (also the peak exiting period). Table 5-10, above, summarizes ridership during this period.

Overall, vertical elements, faregate aisles, and fare vending machines at the station are projected to operate within capacity, or below a v/c of 0.7. Additionally, platform peak pedestrian LOS (based on the available spacing between passengers) on the busiest platform sections are projected to be at the acceptable LOS B.

Table 5-11 summarizes the results of the Greenbelt Metro Station capacity analysis under the Greenbelt Build Condition, including the vertical elements, fare elements, and platforms. Further details on the station capacity analysis are found in Appendix C3.

Table 5-11: 2022 Greenbelt Build Condition Station Capacity Analysis Summary

Element		Volume to Capacity Ratio (V/C)
Mezzanine/ Platform	Entry Escalators	0.20
	Exit Escalators	-
	Stairs	0.59
Faregate Aisles		0.34
Fare Vending		0.25
Platform Peak LOS		B

Source: WMATA (2014e). WMATA (2014g); Greenbelt Station Site Inventory conducted in December, 2014; Greenbelt Site Transportation Agreement (Appendix C1)

5.5.2.3 NFPA 130 Emergency Evacuation Analysis

An emergency evacuation analysis was conducted to compare evacuation capacity of the Greenbelt Metro Station to standards set by NFPA 130 code (TRB 2013). NFPA 130 requires that station platforms be fully evacuated within 4 minutes and that all passengers reach a “point of safety” within 6 minutes. WMATA Metrorail stations, however, are not required to meet these criteria. Details on the assumptions and calculations necessitated in NFPA 130 are found in Appendix C4. A summary of the emergency evacuation analyses is included below, with further details on the station analysis included in Appendix C4.

The NFPA 130 analysis used the number of entries and exits from the peak 15-minute period under the Greenbelt Build Condition (5:00 PM to 5:15 PM) at the station. Table 5-10 summarizes the volume of passengers entering and exiting the station during this period.

Using the Greenbelt Build Condition peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the platform at the Greenbelt Metro Station could be evacuated in 2.8 minutes, and the entire station could be evacuated to a point of safety within 4.8 minutes.

5.5.3 Bus Analysis

The additional bus trips associated with the Greenbelt Build Condition are summarized in table 5-12. At a local bus mode split of 6.0 percent, approximately 198 additional AM peak hour bus passenger trips and 183 additional PM peak hour bus passenger trips are projected in the study area.

Table 5-12: Greenbelt Build Condition Additional Peak Hour Local Bus Passenger Trips

Employees	Time Period	Proportion of Daily Total	Local Bus Mode Split	TOTAL LOCAL BUS TRIPS
11,055	AM Peak Hour	29%	6.0%	192
	PM Peak Hour	26.9%	6.0%	179
Briefing Center	**Time Period**	**Proportion of Daily Total**	**Local Bus Mode Split**	**TOTAL LOCAL BUS TRIPS**
250	AM Peak Hour	36%	6.0%	6
	PM Peak Hour	29%	6.0%	4
Total People	**Time Period**			**TOTAL LOCAL BUS TRIPS**
11,305	**AM Peak Hour**			**198**
	PM Peak Hour			**183**

Source: Greenbelt Site Transportation Agreement (Appendix C1)

The additional peak hour bus passenger trips associated with the Greenbelt Build Condition were added to the peak hour bus volumes calculated for the study area in the 2022 No-build Condition. The trips were added proportionally to each route within the study area based on No-build Condition ridership. The overall analysis was limited to Metrobus service, as no ridership data was available for TheBus and the Central Maryland RTA Route G only serves the study area on weekends. It can be assumed, however, that TheBus would see some minor increases in ridership on routes that serve the site.

Overall, AM peak hour Greenbelt Build Condition Metrobus volumes are projected to total 1,011 passengers, and PM peak hour volumes are projected to total 985 passengers. These totals are both below the overall capacity of services (see table 5-13) in the study area, meaning the additional passenger trips projected can be adequately handled by current service levels. The capacity of services includes the additional capacity associated with the added bus trips in the No-build Condition (five AM peak hour and eight PM peak hour). Additionally, no individual routes are expected to experience capacity issues, primarily due to the additional bus trips added in the No-build Condition. Appendix C6 has further details on the bus capacity analysis.

Table 5-13: Greenbelt Build Condition Bus Capacity Analysis

Measure	2014		2022 No- build		2022 Build Condition	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Total Volume	671	654	813	803	1,011	985
Total Capacity	1,337	1,273	1,593	1,609	1,593	1,609
Volume to Capacity Ratio (V/C)	0.50	0.51	0.51	0.50	0.63	0.61

Sources: Greenbelt Site Transportation Agreement (Appendix C1); WMATA (2014b); WMATA (2014g); MWCOG (2015)

5.5.4 Level of Impact

The increase in public transit trips from the Greenbelt Build Condition would have the following impacts to transit:

- No individual Metrobus routes would see capacity issues under the Build Condition, due to the additional peak hour bus trips planned under the No-build Condition. Therefore, the overall capacity of bus services in the study area would accommodate the projected ridership.

- Metrorail car passenger loads through the study area are projected to be at acceptable levels.
- Overall, Metrorail vertical elements, faregate aisles, and fare vending machines at the Greenbelt Metro Station are projected to operate below capacity.
- Metrorail platform peak pedestrian LOS (based on the available spacing between passengers) on the busiest platform sections are projected to be at the acceptable LOS B at the Greenbelt Metro Station.
- Platform and station evacuation times would increase slightly over the No-build Condition; however, they would continue to meet NFPA 130 standards.

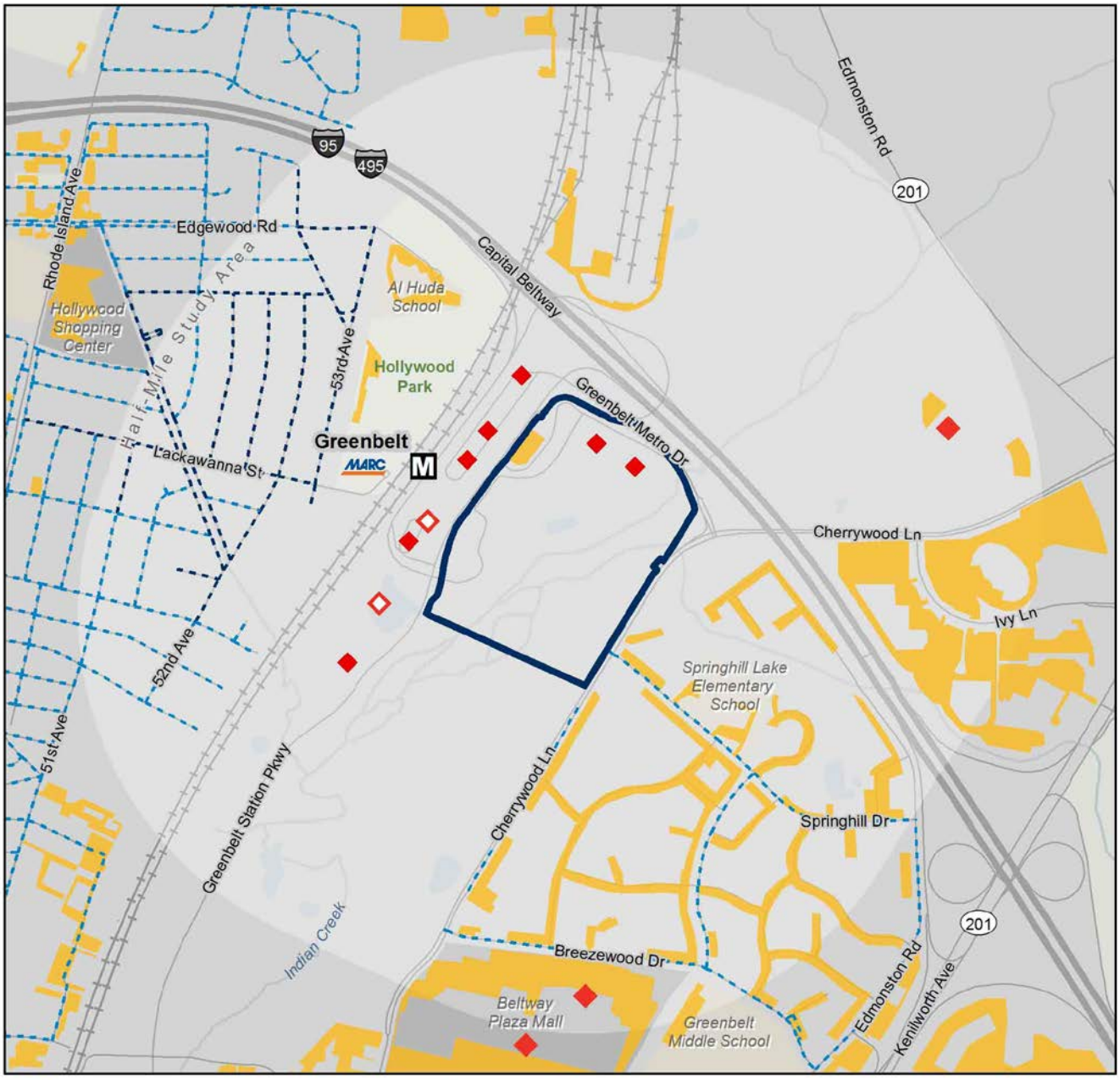
Therefore, the Greenbelt Build Condition would have no measurable direct, long-term impacts to public transit capacity based on the impacts definitions described in Section 2.3. In addition, bus operation delays along Edmonston Road would impact three bus routes, resulting in direct, long-term, major adverse impacts to bus operations. Because buses regularly service Greenbelt Metro Drive, there would be direct, short-term, adverse construction impacts caused by construction vehicles blocking some or all of the lanes and intermittent road closures.

5.6 Parking

Under the Build Condition, employee parking garages would be located to the north of the Main Building developable area along the northern site boundary, adjacent to Greenbelt Metro Drive (figure 5-3). Given the distance to the nearest transit station, and in accordance with NCPC parking policy, a parking ratio of one parking space for every three employees would be maintained, equating to approximately 3,600 spots. In the conceptual site layout analyzed in the EIS, these spaces would be accommodated in two, eight-story parking structures. The final number and layout of the parking structures to accommodate the required employee and fleet vehicle parking would be determined during the design process. Up to 135 visitor parking spaces would be provided near the Visitor Center.

While all employee and visitor parking is envisioned to be accommodated onsite, it is likely that there would be more employee demand for driving than there are parking spaces due to the less than 1:1 ratio of parking spaces to employees (not all employees will have a parking spot) as recommended by NCPC policies. As an “end-of-the-line” station, Metrorail may not seem like the best travel option from other sides of the city. Therefore, some employees may try to park on local streets or park on local residential streets that do not have parking restrictions, and possibly even try to park on those residential streets with parking restrictions. Still others may choose to pay to park in local area parking garages that will be built as part of the Greenbelt Station development. Development and implementation of a Transportation Management Plan (TMP), which includes Transportation Demand Management (TDM) measures that will encourage employees to use transit and discourage employees from driving and parking offsite, will address these issues and reduce any adverse parking impacts anticipated at the Greenbelt site. With implementation, monitoring, and enforcement of a TMP, and revisions as needed, the Build Condition would result in no measurable direct, long-term impacts to local area parking. Assuming all construction equipment and employee parking areas would be contained to the Greenbelt site, there would be no measurable direct, short-term impacts to parking in the study area during the construction period.

Figure 5-3: Greenbelt Site Parking



5.7 Truck Access

Truck access for the Greenbelt site would occur at the southwestern corner of the site off of Greenbelt Station Parkway. Trucks would enter through the South Access and exit through a separate driveway from the RDF to Greenbelt Station Parkway. Trucks would also only be permitted to enter and exit during non-peak hours, therefore peak traffic hours on adjacent roadways would not be impacted. Truck entrance and exit locations and restricted hours would be noted at entrance locations and communicated to those services that would provide regular truck delivery to the site.

Therefore, under the Build Condition, there would be no measurable direct, long-term impacts to truck access given communication of truck access regulations. Assuming the Greenbelt site would have access entrances and exits assigned for construction equipment and general trucks during the construction period, there would be no measureable direct, short-term impacts to truck access.

5.8 Traffic Analysis

The future projected traffic analysis is based on the proposed alternative to consolidate FBI HQ at the Greenbelt site. The next sections describe the process the study followed to project future traffic volumes through three primary assumptions: trip generation, modal split, and trip distribution, followed by the impacts as a result of the proposed alternative.

5.8.1.1 Total Vehicle Trips

The projected person trips are explained in the Trip Generation and Modal Split section (see Section 5.2). Based on the trip generation rates combined with the SOV and HOV modal split and persons per carpool, the total vehicle trips are forecasted to be 1,025 inbound and 75 outbound during the AM peak hour and 49 inbound and 966 outbound during the PM peak hour.

Tables 5-14 and 5-15 summarize the vehicle trips based on the trip generation and the mode split.

Table 5-14: AM Peak Hour Vehicle Trips

Calculated Steps	AM Peak Hour (7:45 AM – 8:45 AM)									
	FBI Employees				Briefing Center [a]				Total People	
	Inbound		Outbound		Inbound		Outbound		TOTAL	
	SOV	HOV	SOV	HOV	SOV	HOV	SOV	HOV	In-bound	Out-bound
Employees or Seats	11,055				250					
Trip Generation	29%				36%					
Inbound/ Outbound Split	93%		7%		100%		0%			
Modal Split	29.7%	11.0%	29.7%	11.0%	29.7%	11.0%	29.7%	11.0%		
Total Trips without HOV adjustment	886	328	67	25	27	10	0	0		
HOV Vehicle Occupancy		3		3		3		3		
Total Trips	**886**	**109**	**67**	**8**	**27**	**3**	**0**	**0**	**1,025**	**75**

[a] Assumes a 500-seat facility where external trips represent 50% of attendees.

Table 5-15: PM Peak Hour Vehicle Trips

Calculated Steps	PM Peak Hour (5:00 PM – 6:00 PM)									
	FBI Employees				Briefing Center [a]				Total People	
	Inbound		Outbound		Inbound		Outbound		TOTAL	
	SOV	HOV	SOV	HOV	SOV	HOV	SOV	HOV	In-bound	Out-bound
Employees or Seats	11,055				250					
Trip Generation	26.9%				29%					
Inbound/ Outbound Split	5%		95%		0%		100%			
Modal Split	29.7%	11.0%	29.7%	11.0%	29.7%	11.0%	29.7%	11.0%		
Total Trips without HOV adjustment	44	16	839	311	0	0	22	8		
HOV Vehicle Occupancy		3		3		3		3		
Total Trips	**44**	**5**	**839**	**104**	**0**	**0**	**22**	**3**	**49**	**967**

[a] Assumes a 500-seat facility where external trips represent 50% of attendees.

5.8.2 Trip Distribution

Based on the Greenbelt Site Transportation Agreement, it is assumed that 50 percent of existing FBI employees would be consolidated at the Greenbelt site and the other 50 percent would represent FBI employees who would choose to locate in proximity of the proposed Greenbelt site.

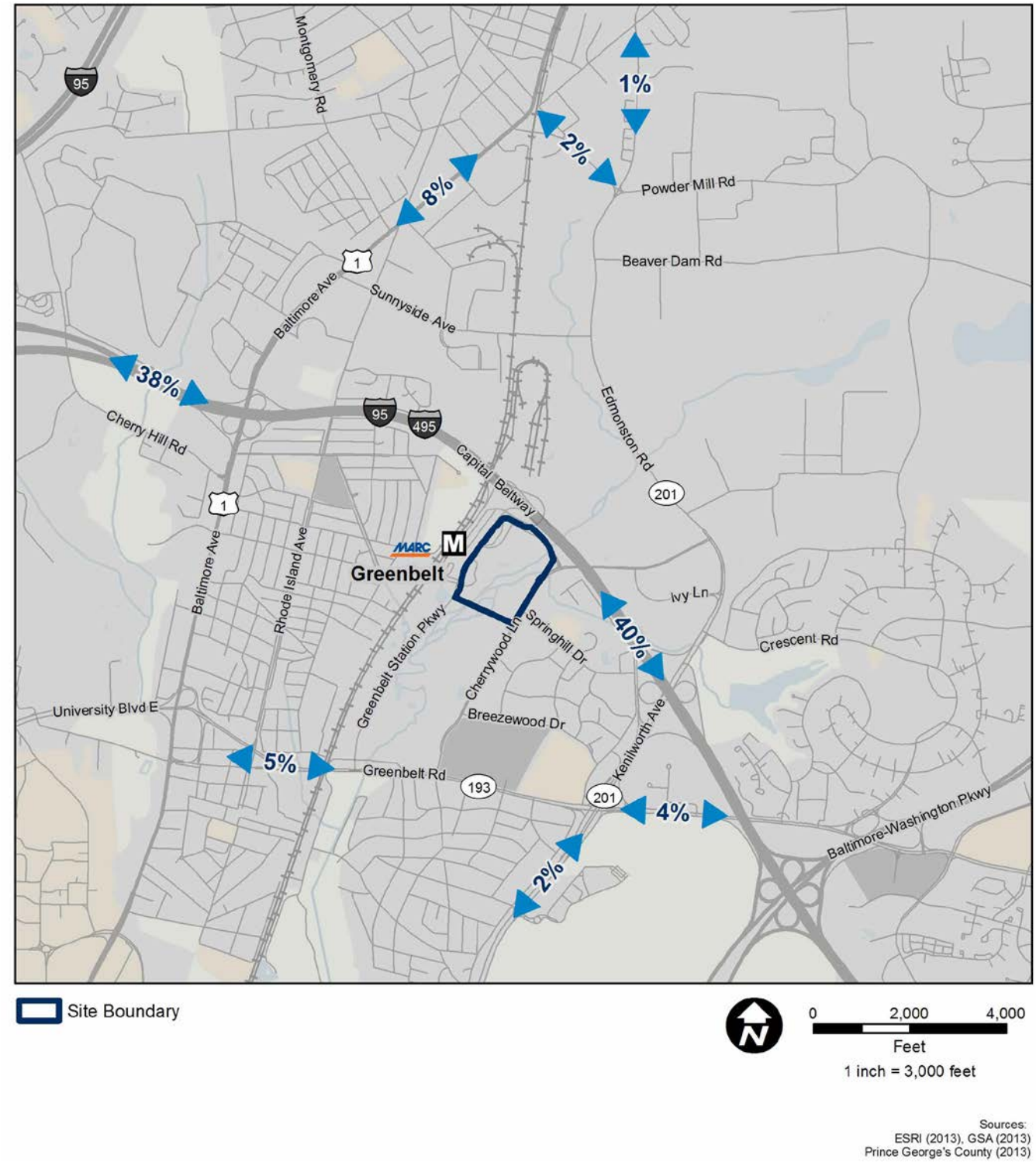
The trip distribution for work trips is composed of two sources, the existing FBI home zip codes and MWCOG travel demand model. The FBI estimates that approximately 50 percent of the existing FBI staff would retire, transfer to another FBI site outside the National Capital Region, or resign once the new HQ is operational; therefore, 50 percent of the distribution is based on the FBI zip code database. The existing FBI home zip codes are used as the home origin and home destination. The other 50 percent of trips are based on distribution patterns in the Greenbelt area from the 2020 MWCOG travel demand model for home-based work trips (MWCOG 2014a), since the model trip tables represent a more local distribution reflecting new employee interest in residing close to the consolidated FBI HQ. The two distribution patterns (home zip code plus MWCOG trip tables) were averaged to form a blended trip distribution. Because the Mission Briefing Center external vehicle trips would most likely not resemble a localized trip pattern, the study used the same blended trip distribution for these vehicle trips.

Table 5-16 shows the Greenbelt Site Transportation Agreement approved blended trip distribution percentages to/from each origin/destination. Figure 5-4 contains the Greenbelt site trip distribution.

Table 5-16: Greenbelt Site Build Condition Trip Distribution Summary

Roadway and Direction	Percentages		AM Trips		PM Trips	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
I-95/I-495 NB	38.0%	38.0%	389	29	19	367
I-95/I-495 SB	40.0%	40.0%	410	30	20	386
U.S. Route 1 NB	8.0%	8.0%	82	6	4	77
Powder Mill Road	2.0%	2.0%	20	2	1	19
MD 193 WB	5.0%	5.0%	51	4	2	48
MD 193 EB	4.0%	4.0%	41	3	2	39
MD 201 NB	1.0%	1.0%	10	1	0	10
MD 201 SB	2.0%	2.0%	20	2	1	19
Total	**100.0%**	**100.0%**	**1,025**	**75**	**49**	**966**

Figure 5-4: Greenbelt Site Build Condition Trip Distribution



5.8.3 Entry Control Facility

The ECF is a security check point for all vehicles to pass through to access the internal roadway serving the parking garages, loading docks, and other components of the Greenbelt site. Each vehicle would be expected to

stop at the facility while FBI security personnel screen the vehicle and occupants before allowing it to proceed. Similar to a tollgate along a highway, the ECF might cause a queue; therefore, part of the analysis must determine if a queue might spill beyond the planned driveway

The ECF has four elements: separate lanes for FBI security personnel to process each vehicle as it arrives at the Greenbelt site; barriers separating each lane; a stop line where each vehicle would be processed; and a merging area after the processing area. Each of these components was coded in the TransModeler™ Traffic Simulation Software (TransModeler™) to best represent the conditions each vehicle would experience as it enters the Greenbelt site. Based on the preliminary conceptual site plan, TransModeler™ allows the ECF components to be situated at their proper location based on the set-back distances already determined through the site plan planning process. Because the preliminary conceptual site plan called for two lanes serving the ECF from each proposed entrance along Greenbelt Station Parkway, five lanes were initially coded to ensure enough capacity. The preliminary conceptual site plan called for two lanes serving the ECF from the southern Greenbelt Station Parkway entrance and two lanes serving the ECF from the northern Greenbelt Station Parkway entrance; however, to avoid any potential delays three-lanes were initially coded for the southern entrance the two lanes were coded for the northern entrance.

The ECF processing times are a critical component of the analysis because the times determine the number of lanes required at each ECF facility to avoid the queue spilling onto the external roadways (Greenbelt Station Parkway in this case). It was determined that existing processing times at the JEH building would provide the best indication of future processing time at the three alternative sites. A special ECF processing study was undertaken on December 4, 2014, between 6:20 AM and 7:50 AM during the AM peak period. Processing times and vehicle occupancy were recorded for each vehicle (78 vehicles) entering the JEH parking garage located under the building. A parking garage guard shift change occurred during the survey midpoint, allowing approximately half the sampling during the first guard and half during the second guard, thereby providing a good cross section of processing times. Processing times ranged from 7 seconds for SOV vehicles up to 103 seconds for vanpools.

Based on the processing times obtained through the survey, a probability triangle was created to develop a range of vehicle processing times to code into TransModeler™. These probabilities range from 10 percent to 90 percent, fitting a triangular distribution (a continuous probability distribution shaped like a triangle defined by three values: the minimum or 10th percentile value, the maximum or 90th percentile value, and the peak or 50th percentile value). Based on the survey, there was an average of 14.1 seconds per vehicle, which includes carpools and vanpools entering. Since the carpool and vanpools represent a small number of vehicles entering and have much higher processing times than SOVs, the average without those vehicles was calculated, resulting in 12.3 seconds per SOV vehicle. The 14.1 second value was assigned the 90th percentile and the 12.3 seconds was assigned the 50th percentile. To be conservative, the 10th percentile was calculated based on the percent difference between 50th percentile value (12.3 seconds) and 90th percentile value (14.1 seconds).The difference of 1.73 percent subtracted from 12.3 seconds resulted in a 10th percentile value of 10.6 seconds per vehicle. Since TransModeler™ requires a percentage assigned to each processing time, the 15th and 85th percentiles were interpolated to fill in the remaining 30 percent in the processing times. Table 5-17 contains the processing probabilities.

Table 5-17: Processing Probabilities

	10th Percentile	15th Percentile	50th Percentile	85th Percentile	90th Percentile
Percentage used in TransModeler™	10	15	50	15	10
Vehicles per Second	10.6	10.8	12.3	13.9	14.1

Once the ECFs were coded, simulations were run to observe how TransModeler™ assigned each vehicle to the available lanes. Calibrations were entered to balance the use of available lanes, thus providing the highest capacity given the available queuing space. The ECF analysis was conducted after all the external roadway mitigation measures (recommended improvements to address failing traffic operations) were determined. This allowed for TransModeler™ to be coded with the recommended lane geometry (number of left-turn, through, and right-turn lanes) and traffic signal timings before testing the ECF queuing, thus the maximum number of inbound FBI vehicles would be entering the Greenbelt site.

The ECF simulation analysis followed a statistical approach. This was performed by running the simulation 25 times to calculate the standard deviation based on the vehicle hours of travel (VHT) metric. VHT provides a good indication of vehicle delays by requiring more simulations given facility operation and queuing issues. Using the calculated standard deviation, the number of simulations required was calculated to be within plus or minus 2 percent at the 95th percentile confidence interval (when all the required simulation runs are averaged, 95 percent of the results will be accurate to within plus or minus two percent).

Once the simulations were completed, three different measures were extracted from TransModeler™ to report the estimated queuing based on the total number of available lanes. These measures included vehicles processed per hour, average queue length (similar to the 50th percentile queue length) and maximum queue length (similar to a 100th percentile queue length). Together, these values provide an indication whether or not the available queue space would provide enough storage or the queue will impact Greenbelt Station Parkway.

Based on the ECF processing time probabilities entered into TransModeler™, the software reported an upper limit of approximately 200 vehicles per hour per entry lane being processed. By comparison, the *Better Military Traffic Engineering Pamphlet 55-17* (SDDCTEA 2011), reports the lowest range of vehicle throughput for manually controlled operations as 300 vehicles per hour per lane. This value represents conditions at a military base under the BRAVO Force Protection alert status or a condition where each vehicle would be required to be inspected as well as each occupant. The ECF processing time therefore represents a reasonable and conservative estimate.

5.8.4 Development of Build Condition

Since there are multiple routes that could be accessed between Greenbelt Road and the site as well as ways to enter and exit from the adjacent roadways, TransModeler™ also performed the selection of which route to assign vehicle trips. Performing the vehicle assignments required validating and calibrating the TransModeler™ developed roadway network. Appendix C9 contains the TransModeler™ validation and calibration process.

Once calibrated and validated based on the existing conditions, the study area intersections (modeled network) were adjusted to match the optimized traffic signal settings calculated through the No-build Condition. This reflects adjusted signal timings based on the No-build Condition projected vehicle volumes because it is assumed that Maryland SHA would revise the traffic signals to improve the vehicle flow over the next 8 years leading to 2022 based on vehicle volumes changing due to the planned developments.

The Greenbelt site internal roadway network was added to the modeled network based on the preliminary conceptual site plan, which included roadway connections to the external network. Because of the magnitude of the proposed development in terms of FBI vehicle trips, the intersections serving the Greenbelt site were designed with traffic signals and optimized to handle an estimate of the future Build Condition traffic volumes. These intersection upgrades are probably mitigation measures and are further analyzed in the Build with Mitigation Condition to determine their final recommended design. Synchro™ was used to develop the traffic signal timing plans and entry and exit driveway lane geometry based on forecasted FBI vehicle volumes. The following potential mitigation measures were coded to reflect necessary upgrades to the intersections serving the site driveways.

- Greenbelt Metro Drive and Site North Access (exit only): Install a traffic signal at the intersection.
- Update the traffic signal timing along Greenbelt Station Parkway by optimizing the timings based on the forecasted FBI vehicle trips and coordinate the signals.

The entry driveways leading to ECF facilities were coded to match or exceed the number of entry lanes designed in the preliminary conceptual site plan to minimize trip assignment (trip redistributions that would occur in the model) based on ECF facility delays. (Note that the revised conceptual site plan shows six total inbound lanes due to the analysis performed in the mitigation section) to minimize trip assignment based on ECF facility delays. These facilities are considered part of the preliminary conceptual site plan and are not mitigation measures. The following two locations were coded in TransModeler™ to serve as entrances leading to the ECFs:

- Greenbelt Station Parkway and Site South Access: Three-lane entry only
- Greenbelt Station Parkway and Site Northwest Access: Two-lane entry and one-lane exit

Following a few more simulation trails using TransModeler™, it became necessary to improve the manner in which the internal roadways were proposed to operate to avoid major queuing issues inside the fence. Thus, the following adjustments were coded in TransModeler™:

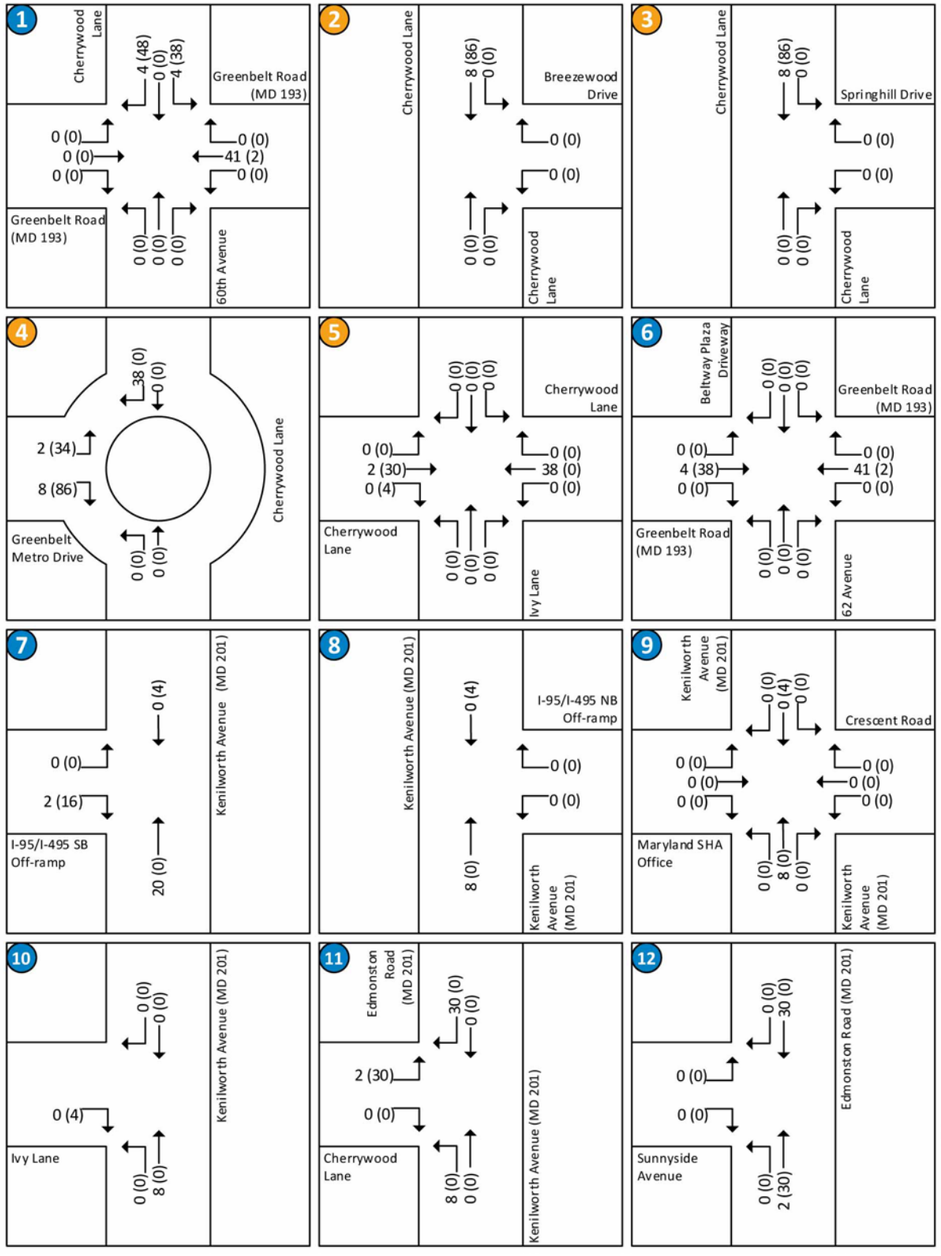
- Upgrade the intersection between the roadway accessing the Site South Access (north-south orientation) and the roadway connecting the Site Northwest Access and garages to a traffic signal control to avoid causing a queue along the Site South Access back through the ECF
- Assign the middle lane along the Site Northwest Access as reversible depending on the time of day (eastbound during the AM peak period and westbound at all other times)

Once the modeled network contained the No-build Condition traffic signal timings, connections between the Greenbelt site and external roadway, traffic signals directly serving the proposed site driveways, and internal improvements, TransModeler™ was used to assign vehicle trips to the modeled network through a process called Dynamic Traffic Assignment (DTA). The DTA is a process where vehicle trips are assigned through a testing process during a number of simulation runs. The DTA goal is to develop a trip assignment that provides the best travel times for all vehicles. Once the vehicle travel times are minimized, the number of vehicles assigned to each route where multiple routes between the same origin and destination exist will be balanced. This mimics the activity commuters undertake then they seek alternative routes to avoid traffic delays. Commuters naturally improve traffic conditions where an alternative route has the capacity to handle the increase in vehicle volumes. To allow the software to test a number of options, the software was set for 30 simulation runs. At the conclusion of the simulation runs, the software recorded the version with the best vehicle travel times; these vehicle routes were used to perform the operation and queue analysis using Synchro™. Since there two entrances and exits to the Greenbelt site both resulting in similar travel distances between I-95/I-495 and the proposed parking garages on the site, the DTA result provided a split between the two entrances and two exits. Table 5-18 contains the DTA vehicle assignment. Figure 5-5 shows the Build Condition trip generation turning movement volumes and figure 5-6 contains the Build Condition turning movement volumes, and figure 5-7 contains the Build Condition lane geometry.

Table 5-18: DTA Vehicle Assignments

Route Origin	Primary Route to Site	AM Peak Hour		PM Peak Hour	
		Inbound	Outbound	Inbound	Outbound
I-95/I-495 North	Site South Access	48%	N/A	Closed	N/A
	Greenbelt Station Parkway/Site Northwest Access	52%	100%	100%	100%
I-95/I-495 South	Site South Access	50%	N/A	Closed	N/A
	Greenbelt Station Parkway /Site Northwest Access	50%	0%	100%	0%
	Site North Access/Greenbelt Metro Drive	N/A	100%	N/A	100%
U.S. Route 1 North via I-95 North	Site South Access	44%	N/A	Closed	N/A
	Greenbelt Station Parkway /Site Northwest Access	56%	100%	100%	100%
Powder Mill Road via Cherrywood Drive	Greenbelt Metro Drive/Site South Access	15%	N/A	Closed	N/A
	Greenbelt Metro Drive/Site Northwest Access	85%	0%	No Trips	0%
	Site North Access/Greenbelt Metro Drive	N/A	100%	No Trips	100%
Greenbelt Road West	Greenbelt Station Parkway/Site South Access	60%	N/A	Closed	N/A
	Greenbelt Station Parkway/Site Northwest Access	40%	0%	100%	0%
	Site North Access/Metro Drive/Cherrywood Lane	N/A	100%	N/A	100%
Greenbelt Road East	Greenbelt Station Parkway/Site South Access	60%	N/A	Closed	N/A
	Greenbelt Station Parkway/Site Northwest Access	40%	0%	100%	0%
	Site North Access/Metro Drive/Cherrywood Lane	N/A	100%	N/A	100%
Edmonston Road North via Cherrywood Lane	Greenbelt Metro Drive/Greenbelt Station Parkway/Site South Access	0%	N/A	Closed	N/A
	Greenbelt Metro Drive/Greenbelt Station Parkway/Site Northwest Access	100%	No Trips	100%	0%
	Site North Access/Metro Drive	N/A	No Trips	N/A	100%
Kenilworth Avenue South	Cherrywood Lane/Greenbelt Metro Drive/Greenbelt Station Parkway/Site Northwest Access	40%	N/A	Closed	N/A
	I-95 South/ Site South Access	30%	N/A	Closed	N/A
	I-95 South/Site Northwest Access	30%	0%	100%	0%
	Site North Access/Greenbelt Metro Drive/I-95 South	N/A	100%	N/A	80%
	Site North Access/Greenbelt Metro Drive/Cherrywood Lane	N/A	0%	N/A	20%

Figure 5-5: Build Condition Trip Generation



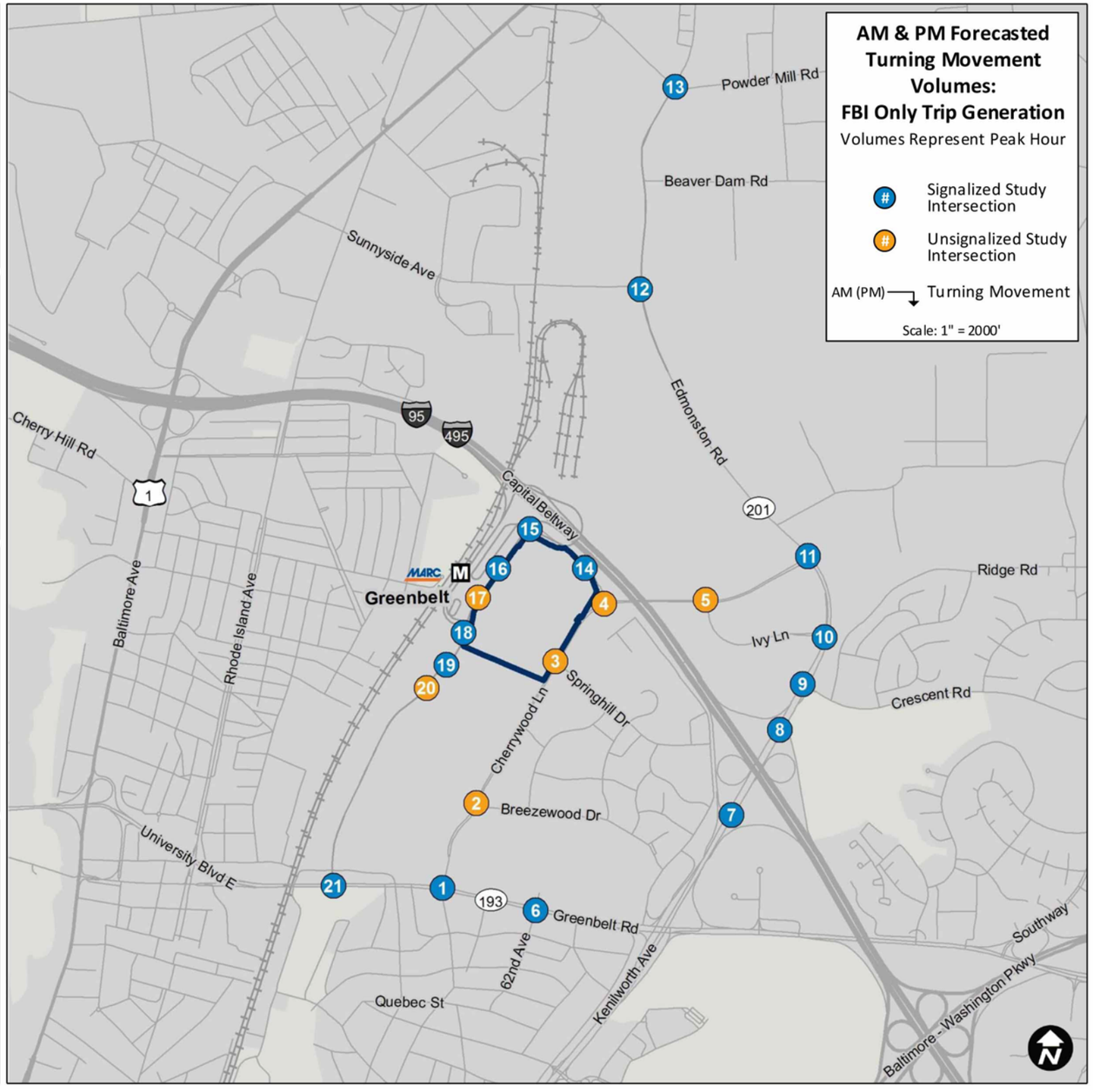
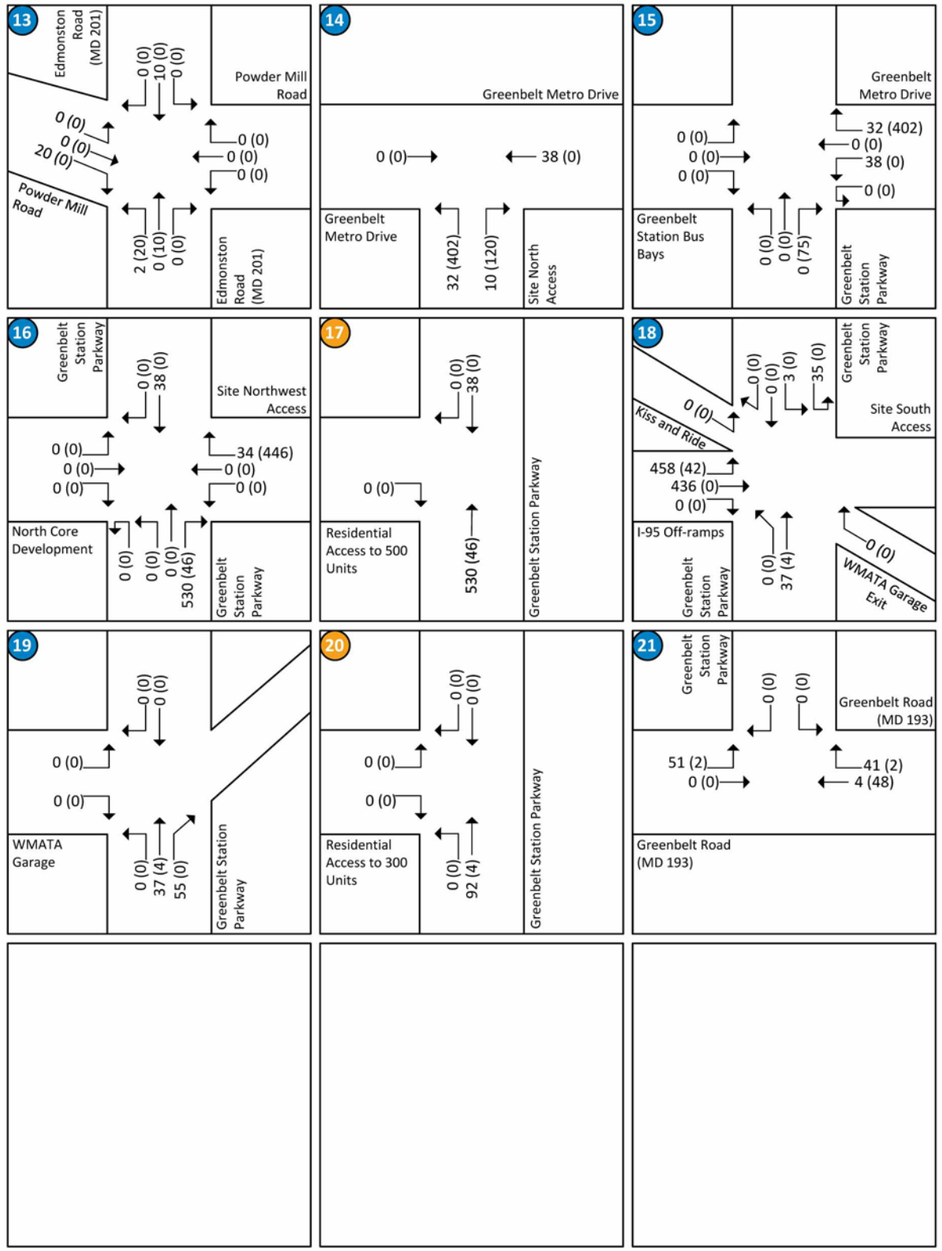


Figure 5-5: Build Condition Trip Generation (continued)



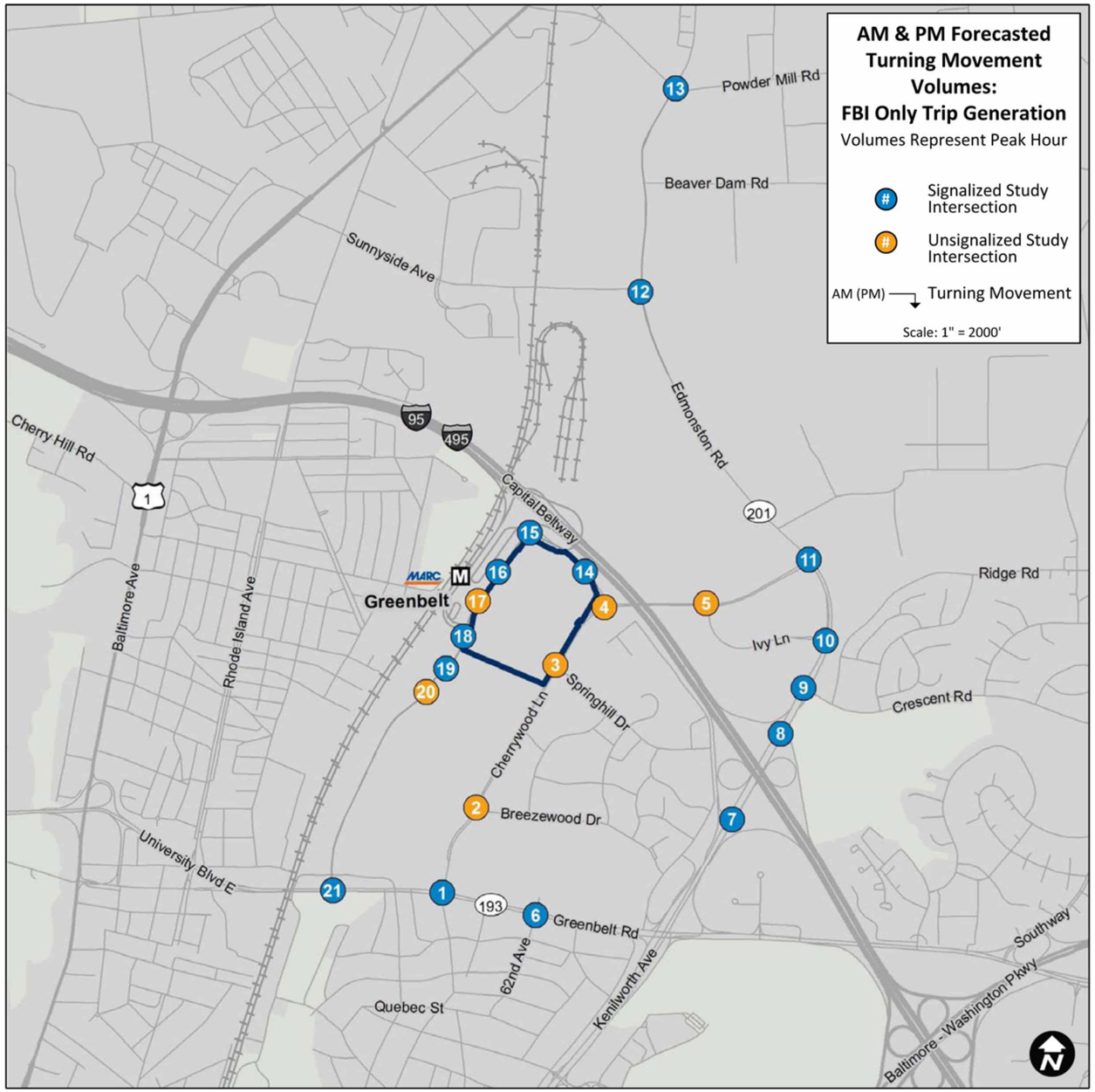


Figure 5-6: Build Condition Turning Movement Volumes

Figure 5-6: Build Condition Turning Movement Volumes (continued)

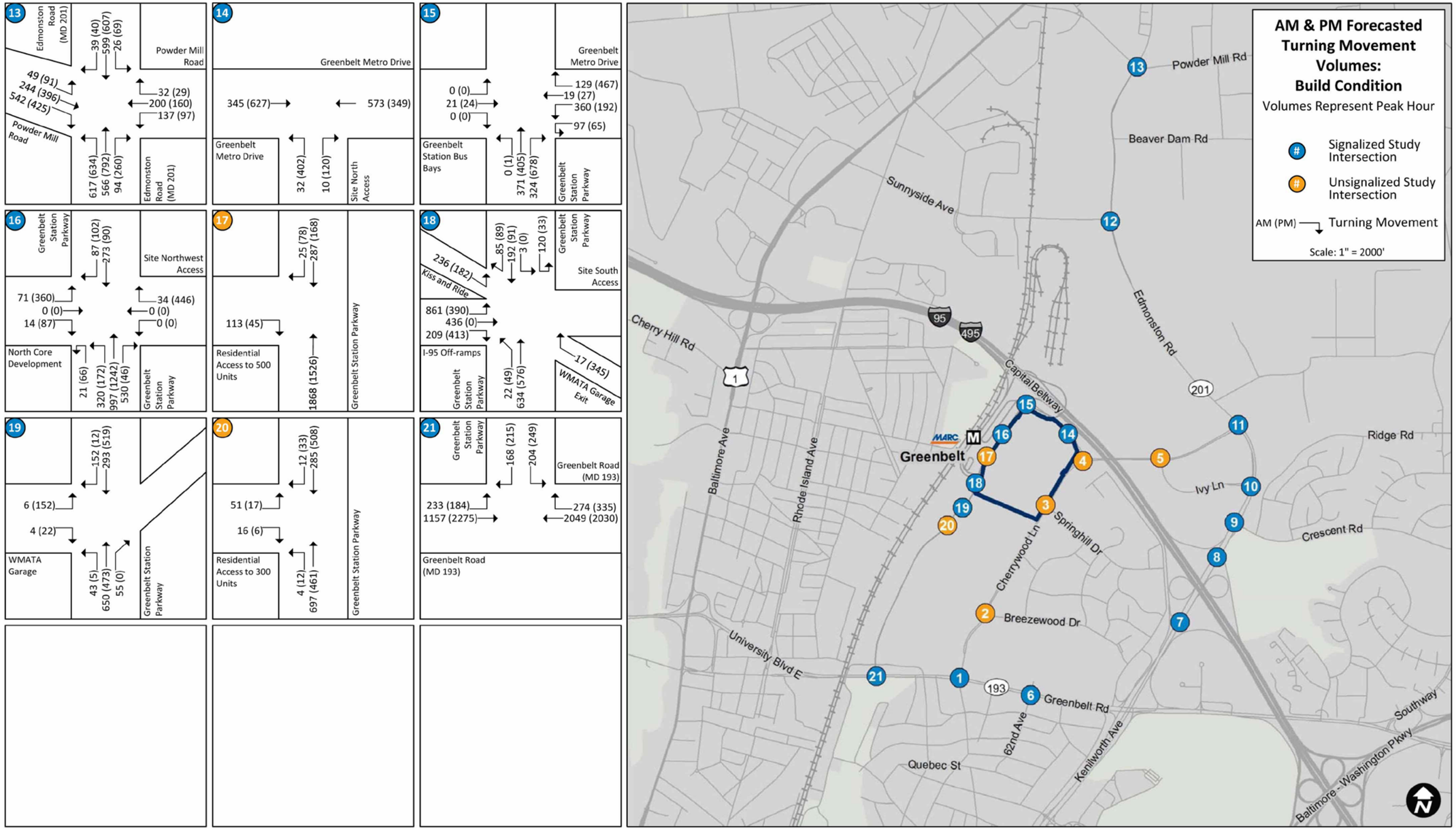
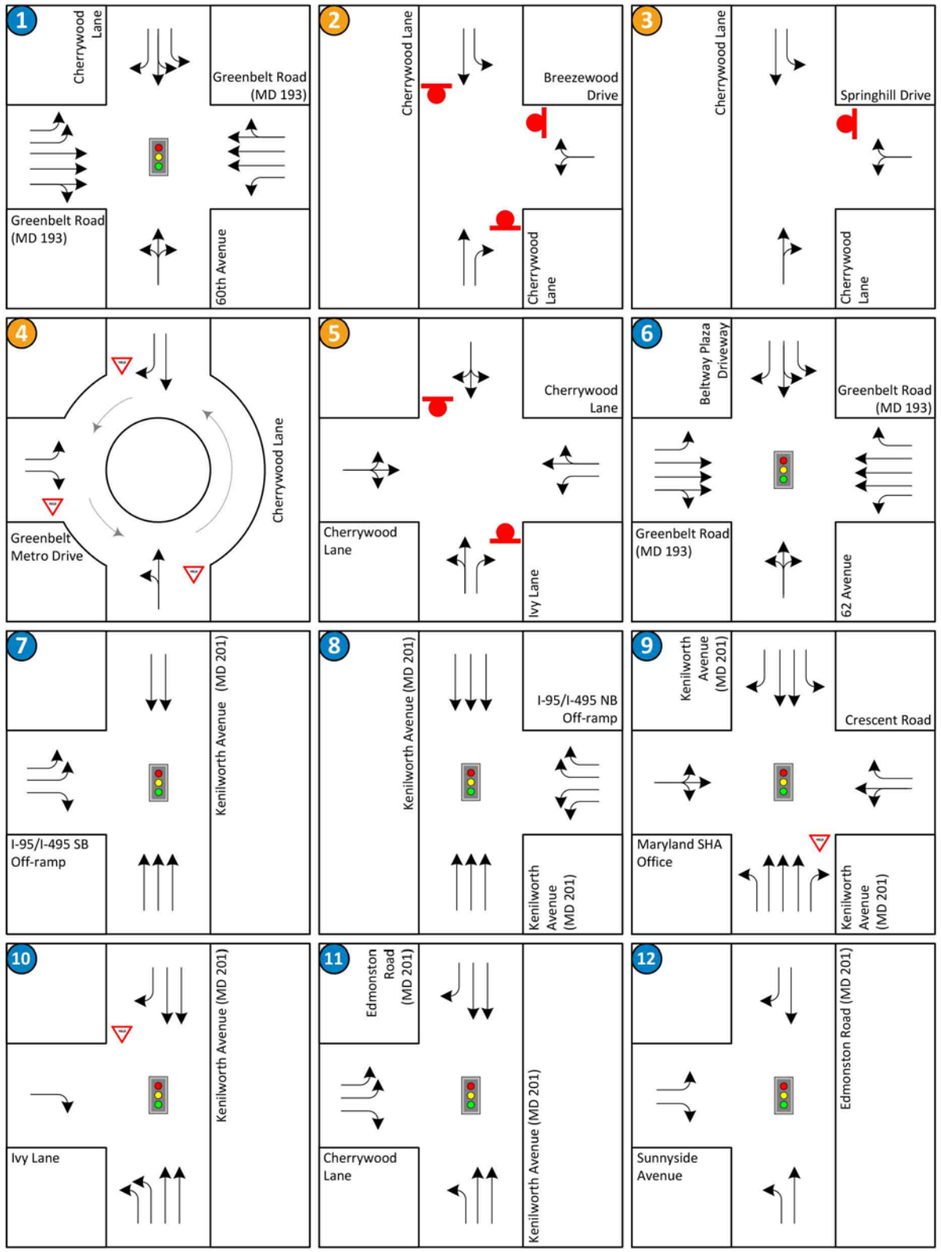


Figure 5-7: Build Condition Lane Geometry



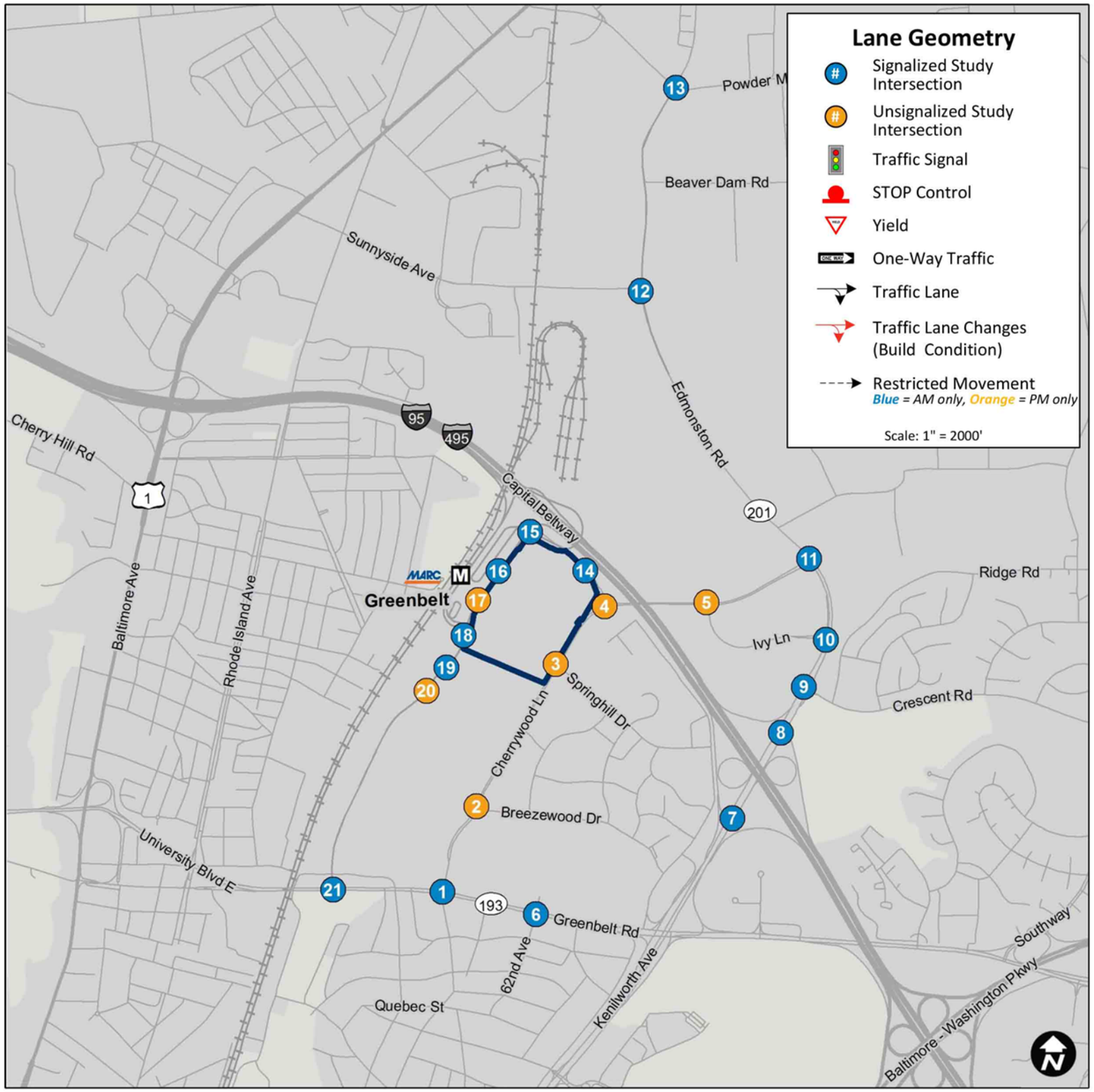


Figure 5-7: Build Condition Lane Geometry (continued)

5.8.5 Build Condition Operations Analysis

Synchro™ was used to calculate the vehicle delay and LOS operation based on the HCM 2000 method for each study area intersection. Custom-designed Excel sheets were used to calculate the LOS operation based on the CLV method. Based on the Synchro™ and CLV-based Excel worksheet analysis, many of the signalized study area intersections would operate at acceptable overall conditions during the morning and afternoon peak hours. However, the following intersections in the study area would operate with overall unacceptable conditions, which includes LOS E or LOS F using the HCM 2000 method or LOS F using the CLV method:

- Edmonston Road (MD 201) and Sunnyside Avenue (Intersection #12) would operate at CLV LOS F during the PM peak hour (same failure in No-build Condition)
- Edmonston Road (MD 201) and Powder Mill Road (Intersection # 13) would operate at CLV LOS F during the PM peak hour (same failure in No-build Condition)

Greenbelt Station Parkway I-95/I-495 Off-ramps/Site South Access/Kiss & Ride would operate at HCM LOS F during the AM peak hour (Intersection # 18).

Based on the Synchro™ analysis, the following individual signalized intersection lane groups or overall approaches would operate under unacceptable conditions (LOS E or LOS F) during the morning or afternoon peak hours. The lane group within the approach that would operate under unacceptable conditions is noted in parentheses; when “overall” is noted, the overall approach movements would operate under unacceptable conditions.

- Greenbelt Road (MD 193) and Cherrywood Lane/60th Avenue (Intersection #1)
    - Eastbound Greenbelt Road (left turns), during the AM peak hour
    - Westbound Greenbelt Road (left turns), northbound 60th Avenue (overall) and southbound Cherrywood Lane (overall) for the AM and PM peak hours
- Greenbelt Road (MD 193) and 62nd Avenue/Beltway Plaza Driveway (Intersection #6)
    - Northbound 62nd Ave (overall) and southbound Beltway Plaza Driveway (overall) during AM and PM peak hours
- Kenilworth Avenue (MD 201) and Crescent Road/Maryland SHA Office (Intersection #9)
    - Southbound Kenilworth Avenue (left turns) during AM peak hour
    - Northbound Kenilworth Avenue (left turns) during the PM peak hour
- Edmonston Road (MD 201) and Sunnyside Avenue (Intersection #12)
    - Eastbound Sunnyside Avenue (overall) and northbound Edmonston Road (left turns) during the AM and PM peak hours
- Edmonston Road (MD 201) and Powder Mill Road (Intersection #13)
    - Eastbound Powder Mill Road (through movements) and westbound Powder Mill Road (left turns) during the AM peak hour
    - Eastbound Powder Mill Road (overall), westbound Powder Mill Road (left turns), northbound Edmonston Road (left turns) and southbound Edmonston Road (overall) during the PM peak hour
- Greenbelt Station Bus Bays/Greenbelt Metro Drive & Greenbelt Station Boulevard (Intersection #15)
    - Eastbound Greenbelt Station bus bays (overall) during the AM peak hour
- Greenbelt Station Parkway and North Core Development/Site Northwest Access (Intersection #16)
    - Eastbound North Core Development (overall), and westbound Site Northwest Access (overall) during the AM peak hour
- Greenbelt Station Parkway and I-95/I-495 Off-ramps/Site South Access/Kiss & Ride (Intersection #18)

    - Eastbound I-95 off-ramps (overall), eastbound kiss and ride (overall) and northbound Greenbelt Station Parkway (left turns) during the AM peak hour
    - Southbound Greenbelt Station Parkway (overall) during the PM peak hour
- Greenbelt Station Parkway and WMATA Garage (Intersection #19)
    - Eastbound WMATA garage (overall) and northbound Greenbelt Station Parkway (combined left and through movements) during the AM peak hour
- Greenbelt Road (MD 193) and Greenbelt Station Parkway (Intersection #21)
    - Eastbound Greenbelt Road (left turns) and southbound Greenbelt Station Parkway (overall) during the AM peak hour
    - Eastbound Greenbelt Road (left turns) and southbound Greenbelt Station Parkway (left turns) during the PM peak hour

5.8.5.1 Unsignalized Intersection Operations Analysis

Based on the unsignalized intersection analysis, only the intersection of Cherrywood Lane and Ivy Lane (Intersection #5) would operate at overall unacceptable conditions during Condition. All other unsignalized intersections in the study area would operate at acceptable overall conditions during the AM and PM peak hours.

The following individual unsignalized intersection lane groups or overall approaches also would operate under unacceptable conditions (LOS E or LOS F) during the morning or afternoon peak hours:

- Westbound Springhill Drive (overall) at the intersection of Cherrywood Lane and Springhill Drive during the PM peak hour (Intersection #3)

- In addition to the overall intersection failing at Cherrywood Lane and Ivy Lane during the PM peak hour, the northbound (left and through movement) and southbound (all movements) approaches on Ivy Lane would fail during the AM peak hour (Intersection #5)

5.8.5.2 Complete Intersection Operations Analysis

This section summarizes the differences in LOS impacts between the Build Condition and the No-build Condition by quantifying the change in intersection operation failures. Following the summary, this section also includes the complete results of the operations analysis in both figures and a table.

Based on the Synchro™ analysis, a total of 10 signalized and 2 unsignalized intersections would experience unacceptable conditions for one or more turning movements. Compared to the No-build Condition, the Build Condition would have one more intersection failing during the AM peak hour and there would be no change in the number of intersections failing during the PM peak hour. In the AM peak hour, compared to the No-build Condition, one intersection that passed overall but now fails, 20 that have not changed, and zero that were failing but now pass. In the PM peak hour there are zero intersections that passed overall but are now failing, 21 that have not changed, and zero that were failing but now pass.

Table 5-19 provides a summary of the number of intersections that meet the following criteria for the overall directional approach that would change between the No-build and the Build Conditions:

Table 5-19: Intersection Operations Summary Comparing No-build Condition to Build Condition

Type of Change Between Conditions	AM	PM
New Failing Approach	0	0
Additional Failing Approaches	1	0
No Change	20	21
Fewer Failing Approaches	0	0
No Failing Approaches	0	0
Total Signalized and Unsignalized Intersections	**21**	**21**

The average LOS for the various approaches to the intersections and the overall intersection LOS grades for the Build Condition are depicted in figures 5-8 and 5-9 for the AM and PM peak hours, respectively. Table 5-20 shows the results of the LOS capacity analysis and the intersection projected delay under the No-build Condition compared to the Build Condition during the AM and PM peak hours.

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Figure 5-8: Build Condition Intersection LOS for AM Peak Hour

Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.

Figure 5-8: Build Condition Intersection LOS for AM Peak Hour (continued)

Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.

Figure 5-9: Build Condition Intersection LOS for PM Peak Hour

Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.

Figure 5-9: Build Condition Intersection LOS for PM Peak Hour (continued)

Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.

Table 5-20: Comparison of No-build and Build Condition Intersection AM and PM Peak Hour Operations Analysis

#	Intersection and Approach	Lane Group	No-build Condition									Build Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
1	**Greenbelt Road (MD 193) & Cherrywood Lane/60th Avenue (Signalized)**																				
	EB (Greenbelt Rd)	L	63.2	E				53.0	D				63.1	E				53.0	D		
	EB (Greenbelt Rd)	TR	8.8	A				13.9	B				8.8	A				13.9	B		
	EB Overall (Greenbelt Rd)		**19.1**	**B**				**21.2**	**C**				**19.0**	**B**				**21.2**	**C**		
	WB (Greenbelt Rd)	L	64.2	E				67.0	E				64.5	E				67.1	E		
	WB (Greenbelt Rd)	TR	20.6	C				35.7	D				21.2	C				35.8	D		
	WB Overall (Greenbelt Rd)		**21.5**	**C**				**36.9**	**D**				**22.1**	**C**				**37.0**	**D**		
	NB (60th Ave)	LTR	74.0	E				132.4	F				74.0	E				132.4	F		
	NB Overall (60th Ave)		**74.0**	**E**				**132.4**	**F**				**74.0**	**E**				**132.4**	**F**		
	SB (Cherrywood Ln)	L	76.7	E				106.8	F				78.1	E				138.9	F		
	SB (Cherrywood Ln)	LT	76.7	E				108.0	F				78.2	E				137.8	F		
	SB (Cherrywood Ln)	R	70.0	E				83.5	F				71.2	E				108.0	F		
	SB Overall (Cherrywood Ln)		**71.9**	**E**				**91.0**	**F**				**73.2**	**E**				**117.8**	**F**		
	Overall		**28.5**	**C**	**1,315**	**D**	**Pass**	**42.2**	**D**	**1,504**	**E**	**Pass**	**28.9**	**C**	**1,335**	**D**	**Pass**	**48.3**	**D**	**1,552**	**E**	**Pass**
2	**Cherrywood Lane & Breezewood Drive (AWSC)**																				
	WB (Breezewood Dr)	LR	13.3	-				12.5	-				13.4	-				13.0	-		
	WB Overall (Breezewood Dr)		**13.3**	**B**				**12.5**	**B**				**13.4**	**B**				**13.0**	**B**		
	NB (Cherrywood Ln)	T	11.2	-				12.4	-				11.3	-				12.9	-		
	NB (Cherrywood Ln)	R	8.7	-				9.4	-				8.7	-				9.7	-		
	NB Overall (Cherrywood Ln)		**10.1**	**B**				**11.1**	**B**				**10.2**	**B**				**11.5**	**B**		
	SB (Cherrywood Ln)	L	9.7	-				10.5	-				9.7	-				10.6	-		
	SB (Cherrywood Ln)	T	10.8	-				15.1	-				11.0	-				21.9	-		
	SB Overall (Cherrywood Ln)		**10.4**	**B**				**13.7**	**B**				**10.6**	**B**				**19.0**	**C**		
	Overall		**11.2**	**B**	**N/A**	**N/A**	**Pass**	**12.5**	**B**	**N/A**	**N/A**	**Pass**	**11.3**	**B**	**N/A**	**N/A**	**Pass**	**15.2**	**C**	**N/A**	**N/A**	**Pass**
3	**Cherrywood Lane & Springhill Drive (TWSC)**																				
	WB (Springhill Dr)	LR	16.4	C				128.6	F				16.5	C				176.5	F		
	WB Overall (Springhill Dr)		**16.4**	**C**				**128.6**	**F**				**16.5**	**C**				**176.5**	**F**		
	SB (Cherrywood Ln)	L	8.3	A				8.7	A				8.3	A				8.7	A		
	SB Overall (Cherrywood Ln)		**3.0**	**-**				**2.4**	**-**				**3.0**	**-**				**2.1**	**-**		
	Overall		**5.2**	**-**	**N/A**	**N/A**	**Pass**	**27.0**	**-**	**N/A**	**N/A**	**Pass**	**5.2**	**-**	**N/A**	**N/A**	**Pass**	**34.3**	**-**	**N/A**	**N/A**	**Pass**

Table 5-20: Comparison of No-build and Build Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
4	**Cherrywood Lane & Greenbelt Metro Drive (Roundabout)** [a]																				
	EB (Greenbelt Metro Dr)	LR	6.1	A				14.6	B				6.2	A				16.5	C		
	EB Overall (Greenbelt Metro Dr)		**3.3**	**A**				**7.5**	**A**				**3.3**	**A**				**7.9**	**A**		
	NB (Cherrywood Ln)	LT	11.8	B				14.4	B				11.8	B				15.6	C		
	NB Overall (Cherrywood Ln)		**11.8**	**B**				**14.4**	**B**				**11.8**	**B**				**15.6**	**C**		
	SB (Cherrywood Ln)	T	6.3	A				12.0	B				6.3	A				12.0	B		
	SB Overall (Cherrywood Ln)		**2.2**	**A**				**8.9**	**A**				**2.0**	**A**				**8.9**	**A**		
	Overall		**6.0**	**A**	**N/A**	**N/A**	**Pass**	**9.8**	**A**	**N/A**	**N/A**	**Pass**	**5.8**	**A**	**N/A**	**N/A**	**Pass**	**10.0**	**B**	**N/A**	**N/A**	**Pass**
5	**Cherrywood Lane & Ivy Lane (TWSC)**																				
	EB (Cherrywood Ln)	LTR	3.0	A				0.4	A				3.1	A				0.4	A		
	EB Overall (Cherrywood Ln)		**3.0**	**-**				**0.4**	**-**				**3.1**	**-**				**0.4**	**-**		
	WB (Cherrywood Ln)	L	8.3	A				8.8	A				8.3	A				8.9	A		
	WB (Cherrywood Ln)	TR	0.0	-				0.0	-				0.0	-				0.0	-		
	WB Overall (Cherrywood Ln)		**0.4**	**-**				**0.2**	**-**				**0.4**	**-**				**0.2**	**-**		
	NB (Ivy Ln)	LT	67.2	F				^	F				79.7	F				^	F		
	NB (Ivy Ln)	R	10.3	B				12.1	B				10.3	B				12.5	B		
	NB Overall (Ivy Ln)		**55.7**	**F**				**^**	**F**				**65.7**	**F**				**^**	**F**		
	SB (Ivy Ln)	LTR	41.0	E				402.7	F				44.7	E				443.6	F		
	SB Overall (Ivy Ln)		**41.0**	**E**				**402.7**	**F**				**44.7**	**E**				**443.6**	**F**		
	Overall		**6.0**	**-**	**N/A**	**N/A**	**Pass**	[b]	**-**	**N/A**	**N/A**	**Fail**	**6.6**	**-**	**N/A**	**N/A**	**Pass**	[b]	**-**	**N/A**	**N/A**	**Fail**
6	**Greenbelt Road (MD 193) & 62 Avenue/Beltway Plaza Driveway (Signalized)**																				
	EB (Greenbelt Rd)	L	1.7	A				7.0	A				1.8	A				7.1	A		
	EB (Greenbelt Rd)	TR	2.6	A				11.3	B				2.7	A				12.2	B		
	EB Overall (Greenbelt Rd)		**2.6**	**A**				**11.2**	**B**				**2.6**	**A**				**12.1**	**B**		
	WB (Greenbelt Rd)	L	4.0	A				24.7	C				4.1	A				25.4	C		
	WB (Greenbelt Rd)	T	7.5	A				18.3	B				7.6	A				18.3	B		
	WB (Greenbelt Rd)	R	4.7	A				14.8	B				4.7	A				14.8	B		
	WB Overall (Greenbelt Rd)		**7.2**	**A**				**17.8**	**B**				**7.4**	**A**				**17.8**	**B**		
	NB (62nd Ave)	LTR	68.1	E				71.4	E				68.1	E				71.4	E		
	NB Overall (62nd Ave)		**68.1**	**E**				**71.4**	**E**				**68.1**	**E**				**71.4**	**E**		
	SB (Beltway Plaza Drwy)	L	68.2	E				69.8	E				68.2	E				69.8	E		
	SB (Beltway Plaza Drwy)	LT	68.3	E				69.5	E				68.3	E				69.5	E		
	SB (Beltway Plaza Drwy)	R	66.7	E				54.9	D				66.7	E				54.9	D		
	SB Overall (Beltway Plaza Drwy)		**67.8**	**E**				**67.1**	**E**				**67.8**	**E**				**67.1**	**E**		
	Overall		**7.5**	**A**	**742**	**A**	**Pass**	**20.4**	**C**	**1,206**	**C**	**Pass**	**7.6**	**A**	**757**	**A**	**Pass**	**20.7**	**C**	**1,220**	**C**	**Pass**

Table 5-20: Comparison of No-build and Build Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
7	**Kenilworth Avenue (MD 201) & I-95/I-495 SB Off-ramp (Signalized)**																				
	EB (I-95/I-495 SB Off-ramp)	L	39.7	D				39.7	D				39.7	D				39.7	D			
	EB (I-95/I-495 SB Off-ramp)	R	6.9	A				0.6	A				7.0	A				0.6	A			
	EB Overall (I-95/I-495 SB Off-ramp)		**13.8**	**B**				**14.9**	**B**				**13.9**	**B**				**14.7**	**B**			
	NB (Kenilworth Ave)	T	4.0	A				4.0	A				4.0	A				4.0	A			
	NB Overall (Kenilworth Ave)		**4.0**	**A**				**4.0**	**A**				**4.0**	**A**				**4.0**	**A**			
	SB (Kenilworth Ave)	T	6.2	A				3.6	A				6.2	A				3.6	A			
	SB Overall (Kenilworth Ave)		**6.2**	**A**				**3.6**	**A**				**6.2**	**A**				**3.6**	**A**			
	Overall		**9.1**	**A**	**730**	**A**	**Pass**	**6.8**	**A**	**593**	**A**	**Pass**	**9.1**	**A**	**730**	**A**	**Pass**	**6.8**	**A**	**594**	**A**	**Pass**
8	**Kenilworth Avenue (MD 201) & I-95/I-495 NB Off-ramp (Signalized)**																				
	WB (I-95/I-495 NB Off-ramp)	L	24.6	C				34.3	C				24.5	C				34.3	C			
	WB (I-95/I-495 NB Off-ramp)	R	26.3	C				31.1	C				26.2	C				31.1	C			
	WB Overall (I-95/I-495 NB Off-ramp)		**25.4**	**C**				**32.8**	**C**				**25.3**	**C**				**32.8**	**C**			
	NB (Kenilworth Ave)	T	11.1	B				5.4	A				11.2	B				5.4	A			
	NB Overall (Kenilworth Ave)		**11.1**	**B**				**5.4**	**A**				**11.2**	**B**				**5.4**	**A**			
	SB (Kenilworth Ave)	T	7.7	A				3.4	A				7.8	A				3.3	A			
	SB Overall (Kenilworth Ave)		**7.7**	**A**				**3.4**	**A**				**7.8**	**A**				**3.3**	**A**			
	Overall		**16.7**	**B**	**868**	**A**	**Pass**	**13.3**	**B**	**779**	**A**	**Pass**	**16.7**	**B**	**868**	**A**	**Pass**	**13.3**	**B**	**781**	**A**	**Pass**
9	**Kenilworth Avenue (MD 201) & Crescent Road/Maryland SHA Office (Signalized)**																				
	EB (Maryland SHA Office)	LTR	26.0	C				36.1	D				26.0	C				36.1	D			
	EB Overall (Maryland SHA Office)		**26.0**	**C**				**36.1**	**D**				**26.0**	**C**				**36.1**	**D**			
	WB (Crescent Rd)	LT	43.2	D				47.8	D				43.2	D				47.8	D			
	WB (Crescent Rd)	R	26.6	C				36.3	D				26.6	C				36.3	D			
	WB Overall (Crescent Rd)		**38.0**	**D**				**43.0**	**D**				**38.0**	**D**				**43.0**	**D**			
	NB (Kenilworth Ave)	L	47.4	D				61.5	E				47.3	D				61.5	E			
	NB (Kenilworth Ave)	T	13.3	B				10.4	B				13.4	B				10.4	B			
	NB (Kenilworth Ave)	R	8.5	A				5.9	A				8.6	A				5.9	A			
	NB Overall (Kenilworth Ave)		**13.9**	**B**				**10.2**	**B**				**14.0**	**B**				**10.2**	**B**			
	SB (Kenilworth Ave)	L	67.1	E				53.3	D				67.0	E				53.8	D			
	SB (Kenilworth Ave)	T	4.7	A				5.8	A				4.7	A				5.8	A			
	SB (Kenilworth Ave)	R	12.0	B				4.9	A				12.0	B				4.9	A			
	SB Overall (Kenilworth Ave)		**9.3**	**A**				**11.1**	**B**				**9.3**	**A**				**11.2**	**B**			
	Overall		**15.1**	**B**	**962**	**A**	**Pass**	**12.9**	**B**	**796**	**A**	**Pass**	**15.1**	**B**	**965**	**A**	**Pass**	**12.9**	**B**	**798**	**A**	**Pass**

Table 5-20: Comparison of No-build and Build Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
10	**Kenilworth Avenue (MD 201) & Ivy Lane (Signalized)**																				
	EB (Ivy Ln)	R	0.1	A				0.7	A				0.1	A				0.8	A		
	EB Overall (Ivy Ln)		**0.1**	**A**				**0.7**	**A**				**0.1**	**A**				**0.8**	**A**		
	NB (Kenilworth Ave)	L	18.6	B				25.8	C				18.6	B				25.8	C		
	NB (Kenilworth Ave)	T	0.3	A				0.2	A				0.3	A				0.2	A		
	NB Overall (Kenilworth Ave)		**3.4**	**A**				**1.7**	**A**				**3.4**	**A**				**1.7**	**A**		
	SB (Kenilworth Ave)	T	0.7	A				1.2	A				0.7	A				1.2	A		
	SB (Kenilworth Ave)	R	0.0	A				0.0	A				0.0	A				0.0	A		
	SB Overall (Kenilworth Ave)		**0.7**	**A**				**1.2**	**A**				**0.7**	**A**				**1.2**	**A**		
	Overall		**2.3**	**A**	**784**	**A**	**Pass**	**1.3**	**A**	**761**	**A**	**Pass**	**2.3**	**A**	**784**	**A**	**Pass**	**1.3**	**A**	**761**	**A**	**Pass**
11	**Kenilworth Avenue/Edmonston Road (MD 201) & Cherrywood Lane (Signalized)**																				
	EB (Cherrywood Ln)	L	46.7	D				39.4	D				46.8	D				39.8	D		
	EB (Cherrywood Ln)	R	40.7	D				33.8	C				40.7	D				33.3	C		
	EB Overall (Cherrywood Ln)		**45.7**	**D**				**37.5**	**D**				**45.8**	**D**				**37.6**	**D**		
	NB (Kenilworth Ave)	L	27.0	C				13.8	B				27.6	C				14.0	B		
	NB (Kenilworth Ave)	T	1.1	A				1.2	A				1.1	A				1.3	A		
	NB Overall (Kenilworth Ave)		**11.1**	**B**				**3.5**	**A**				**11.5**	**B**				**3.6**	**A**		
	SB (Edmonston Rd)	T	22.6	C				13.9	B				23.0	C				14.3	B		
	SB (Edmonston Rd)	R	17.5	B				10.0	B				18.5	B				10.3	B		
	SB Overall (Edmonston Rd)		**21.2**	**C**				**13.2**	**B**				**21.7**	**C**				**13.6**	**B**		
	Overall		**18.8**	**B**	**1,212**	**C**	**Pass**	**14.7**	**B**	**990**	**A**	**Pass**	**19.2**	**B**	**1,221**	**C**	**Pass**	**15.2**	**B**	**1,008**	**B**	**Pass**
12	**Edmonston Road (MD 201) & Sunnyside Avenue (Signalized)**																				
	EB (Sunnyside Ave)	L	108.9	F				113.0	F				122.5	F				113.0	F		
	EB (Sunnyside Ave)	R	66.9	E				62.0	E				72.7	E				62.0	E		
	EB Overall (Sunnyside Ave)		**77.9**	**E**				**80.1**	**F**				**85.8**	**F**				**80.1**	**F**		
	NB (Edmonston Rd)	L	102.8	F				98.0	F				117.6	F				98.0	F		
	NB (Edmonston Rd)	T	4.4	A				18.3	B				4.2	A				20.3	C		
	NB Overall (Edmonston Rd)		**29.6**	**C**				**33.3**	**C**				**33.2**	**C**				**34.6**	**C**		
	SB (Edmonston Rd)	T	41.1	D				48.1	D				43.3	D				48.1	D		
	SB (Edmonston Rd)	R	5.0	A				3.8	A				5.0	A				3.8	A		
	SB Overall (Edmonston Rd)		**35.6**	**D**				**41.4**	**D**				**37.6**	**D**				**41.4**	**D**		
	Overall		**40.1**	**D**	**1,486**	**E**	**Pass**	**46.7**	**D**	**1,692**	**F**	**Fail**	**43.6**	**D**	**1,516**	**E**	**Pass**	**47.1**	**D**	**1,722**	**F**	**Fail**

Table 5-20: Comparison of No-build and Build Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
13	**Edmonston Road (MD 201) & Powder Mill Road (Signalized)**																				
	EB (Powder Mill Rd)	L	47.3	D				45.2	D				47.6	D				45.2	D		
	EB (Powder Mill Rd)	T	62.8	E				81.1	F				63.4	E				81.1	F		
	EB (Powder Mill Rd)	R	48.7	D				44.7	D				49.2	D				44.7	D		
	EB Overall (Powder Mill Rd)		**52.8**	**D**				**60.5**	**E**				**53.3**	**D**				**60.5**	**E**		
	WB (Powder Mill Rd)	L	57.0	E				84.1	F				58.4	E				84.1	F		
	WB (Powder Mill Rd)	T	41.8	D				38.4	D				42.2	D				38.4	D		
	WB (Powder Mill Rd)	R	35.6	D				34.1	C				35.9	D				34.1	C		
	WB Overall (Powder Mill Rd)		**46.9**	**D**				**53.4**	**D**				**47.7**	**D**				**53.4**	**D**		
	NB (Edmonston Rd)	L	48.5	D				76.7	E				49.8	D				85.4	F		
	NB (Edmonston Rd)	T	12.8	B				23.2	C				12.7	B				23.6	C		
	NB (Edmonston Rd)	R	8.4	A				12.5	B				8.3	A				12.5	B		
	NB Overall (Edmonston Rd)		**29.7**	**C**				**41.3**	**D**				**30.3**	**C**				**45.1**	**D**		
	SB (Edmonston Rd)	L	40.5	D				54.5	D				40.6	D				54.7	D		
	SB (Edmonston Rd)	TR	52.5	D				60.4	E				53.1	D				60.4	E		
	SB Overall (Edmonston Rd)		**52.0**	**D**				**59.8**	**E**				**52.7**	**D**				**59.8**	**E**		
	Overall		**42.5**	**D**	**1,593**	**E**	**Pass**	**50.9**	**D**	**1,867**	**F**	**Fail**	**43.2**	**D**	**1,595**	**E**	**Pass**	**52.6**	**D**	**1,897**	**F**	**Fail**
14	**Greenbelt Metro Drive & Site North Access (Signalized)** [b]																				
	EB (Greenbelt Metro Dr)	T	N/A	N/A				N/A	N/A				3.5	A				17.5	B		
	EB Overall (Greenbelt Metro Dr)		**N/A**	**N/A**				**N/A**	**N/A**				**3.5**	**A**				**17.5**	**B**		
	WB (Greenbelt Metro Dr)	L	N/A	N/A				N/A	N/A				-	-				-	-		
	WB (Greenbelt Metro Dr)	T	N/A	N/A				N/A	N/A				4.4	A				11.5	B		
	WB Overall (Greenbelt Metro Dr)		**N/A**	**N/A**				**N/A**	**N/A**				**4.4**	**A**				**11.5**	**B**		
	NB (Site North Access)	L	N/A	N/A				N/A	N/A				22.7	C				25.9	C		
	NB (Site North Access)	R	N/A	N/A				N/A	N/A				21.4	C				15.9	B		
	NB Overall (Site North Access)		**N/A**	**N/A**				**N/A**	**N/A**				**22.4**	**C**				**23.6**	**C**		
	Overall		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**4.9**	**A**	**605**	**A**	**Pass**	**18.2**	**B**	**1,029**	**B**	**Pass**

Table 5-20: Comparison of No-build and Build Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
15	**Greenbelt Station Bus Bays/Greenbelt Metro Drive & Greenbelt Station Parkway (Signalized)**																				
	EB (Greenbelt Sta Bus Bays)	LT	75.7	E				54.0	D			75.7	E				54.0	D			
	EB (Greenbelt Sta Bus Bays)	R	-	-				-	-			-	-				-	-			
	EB Overall (Greenbelt Sta Bus Bays)		**75.7**	**E**				**54.0**	**D**			**75.7**	**E**				**54.0**	**D**			
	WB (Greenbelt Metro Dr)	L	56.6	E				45.2	D			54.4	D				40.9	D			
	WB (Greenbelt Metro Dr)	T	35.7	D				31.7	C			33.1	C				30.5	C			
	WB (Greenbelt Metro Dr)	R	36.0	D				31.5	C			33.8	C				36.5	D			
	WB Overall (Greenbelt Metro Dr)		**52.1**	**D**				**41.6**	**D**			**49.4**	**D**				**37.8**	**D**			
	NB (Greenbelt Sta Pkwy)	L	-	-				-	-			-	-				-	-			
	NB (Greenbelt Sta Pkwy)	T	14.3	B				8.4	A			16.2	B				11.1	B			
	NB (Greenbelt Sta Pkwy)	R	13.8	B				21.4	C			24.2	C				18.6	B			
	NB Overall (Greenbelt Sta Pkwy)		**14.0**	**B**				**16.2**	**B**			**19.9**	**B**				**15.8**	**B**			
	Overall		**31.4**	**C**	**644**	**A**	**Pass**	**23.3**	**C**	**603**	**A**	**Pass**	**34.3**	**C**	**682**	**A**	**Pass**	**25.2**	**C**	**813**	**A**	**Pass**
16	**Greenbelt Station Parkway & North Core Development/Site Northwest Access (Signalized)**																				
	EB (North Core Dev)	L	69.2	E				42.1	D			69.5	E				30.2	C			
	EB (North Core Dev)	TR	66.5	E				35.0	C			65.7	E				26.0	C			
	EB Overall (North Core Dev)		**68.8**	**E**				**40.7**	**D**			**68.8**	**E**				**29.4**	**C**			
	WB (Site Northwest Access)	LTR (AM)	-	-				-	-			63.0	E				-	-			
	WB (Site Northwest Access)	LT (PM)	-	-				-	-			-	-				-	-			
	WB (Site Northwest Access)	R (PM)	-	-				-	-			-	-				54.7	D			
	WB Overall (Site Northwest Access)		**-**	**-**				**-**	**-**			**63.0**	**E**				**54.7**	**D**			
	NB (Greenbelt Sta Pkwy)	L	3.9	A				3.6	A			3.0	A				6.9	A			
	NB (Greenbelt Sta Pkwy)	TR	2.2	A				3.4	A			2.9	A				6.7	A			
	NB Overall (Greenbelt Sta Pkwy)		**2.7**	**A**				**3.4**	**A**			**2.9**	**A**				**6.7**	**A**			
	SB (Greenbelt Sta Pkwy)	TR	0.1	A				0.1	A			0.1	A				0.1	A			
	SB Overall (Greenbelt Sta Pkwy)		**0.1**	**A**				**0.1**	**A**			**0.1**	**A**				**0.1**	**A**			
	Overall		**5.4**	**A**	**600**	**A**	**Pass**	**11.0**	**B**	**460**	**A**	**Pass**	**5.7**	**A**	**976**	**A**	**Pass**	**18.3**	**B**	**952**	**A**	**Pass**
17	**Greenbelt Station Parkway & Residential Access to 500 Units (TWSC)**																				
	EB (Residential Access)	R	9.8	A				9.3	A			10.0	A				9.3	A			
	EB Overall (Residential Access)		**9.8**	**A**				**9.3**	**A**			**10.0**	**A**				**9.3**	**A**			
	Overall		**0.6**	**-**	**N/A**	**N/A**	**Pass**	**0.2**	**-**	**N/A**	**N/A**	**Pass**	**0.5**	**-**	**N/A**	**N/A**	**Pass**	**0.2**	**-**	**N/A**	**N/A**	**Pass**

Table 5-20: Comparison of No-build and Build Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
18	**Greenbelt Station Parkway & I-95/I-495 Off-ramps/Site South Access/Kiss & Ride (Signalized)**																				
	EB (I-95 Off-ramps)	L	71.7	E				44.8	D				282.5	F				46.0	D		
	EB (I-95 Off-ramps)	LTR	56.3	E				31.2	C				204.4	F				31.2	C		
	EB Overall (I-95 Off-Ramps)		**61.7**	**E**				**36.1**	**D**				**230.3**	**F**				**36.5**	**D**		
	EB (Kiss and Ride)	L	55.9	E				37.5	D				57.9	E				38.2	D		
	EB Overall (Kiss and Ride)		**55.9**	**E**				**37.5**	**D**				**57.9**	**E**				**38.2**	**D**		
	WB (Site South Access)	R	37.0	D				35.7	D				42.2	D				35.7	D		
	WB Overall (Site South Access)		**37.0**	**D**				**35.7**	**D**				**42.2**	**D**				**35.7**	**D**		
	NB (Greenbelt Sta Pkwy)	L	81.8	F				33.4	C				79.5	E				33.5	C		
	NB (Greenbelt Sta Pkwy)	T	30.9	C				23.5	C				39.2	D				23.7	C		
	NB Overall (Greenbelt Sta Pkwy)		**32.7**	**C**				**24.3**	**C**				**40.5**	**D**				**24.4**	**C**		
	SB (Greenbelt Sta Pkwy)	L	2.9	A				84.5	F				51.5	D				84.5	F		
	SB (Greenbelt Sta Pkwy)	TR	6.6	A				76.4	E				10.1	B				76.3	E		
	SB Overall (Greenbelt Sta Pkwy)		**5.7**	**A**				**77.7**	**E**				**22.7**	**C**				**77.5**	**E**		
	Overall		**40.0**	**D**	**950**	**A**	**Pass**	**36.9**	**D**	**1,103**	**B**	**Pass**	**141.0**	**F**	**1,514**	**E**	**Fail**	**37.1**	**D**	**1,129**	**B**	**Pass**
19	**Greenbelt Station Parkway & WMATA Garage (Signalized)**																				
	EB (WMATA Garage)	L	76.3	E				51.0	D				76.3	E				51.0	D		
	EB (WMATA Garage)	R	72.4	E				37.8	D				72.4	E				37.8	D		
	EB Overall (WMATA Garage)		**74.9**	**E**				**49.3**	**D**				**74.9**	**E**				**49.3**	**D**		
	NB (Greenbelt Sta Pkwy)	LT	65.7	E				51.5	D				63.4	E				51.4	D		
	NB (Greenbelt Sta Pkwy)	TR	3.0	A				4.6	A				4.1	A				4.6	A		
	NB Overall (Greenbelt Sta Pkwy)		**34.7**	**C**				**28.3**	**C**				**33.8**	**C**				**28.2**	**C**		
	SB (Greenbelt Sta Pkwy)	T	18.8	B				20.5	C				21.0	C				20.5	C		
	SB (Greenbelt Sta Pkwy)	R	38.5	D				12.9	B				41.2	D				12.9	B		
	SB Overall (Greenbelt Sta Pkwy)		**25.5**	**C**				**20.3**	**C**				**27.9**	**C**				**20.3**	**C**		
	Overall		**31.4**	**C**	**429**	**A**	**Pass**	**27.8**	**C**	**524**	**A**	**Pass**	**32.0**	**C**	**480**	**A**	**Pass**	**27.8**	**C**	**524**	**A**	**Pass**
20	**Greenbelt Station Parkway & Residential Access to 300 Units (TWSC)**																				
	EB (Residential Access)	LR	21.1	C				20.8	C				24.4	C				20.9	C		
	EB Overall (Residential Access)		**21.1**	**C**				**20.8**	**C**				**24.4**	**C**				**20.9**	**C**		
	NB (Greenbelt Sta Pkwy)	LT	0.2	A				0.8	A				0.2	A				0.7	A		
	NB Overall (Greenbelt Sta Pkwy)		**0.1**	**-**				**0.3**	**-**				**0.1**	**-**				**0.3**	**-**		
	Overall		**1.5**	**-**	**N/A**	**N/A**	**Pass**	**0.6**	**-**	**N/A**	**N/A**	**Pass**	**1.6**	**-**	**N/A**	**N/A**	**Pass**	**0.6**	**-**	**N/A**	**N/A**	**Pass**

Table 5-20: Comparison of No-build and Build Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
21	**Greenbelt Road (MD 193) & Greenbelt Station Parkway (Signalized)**																				
	EB (Greenbelt Rd)	L	63.6	E				70.0	E				67.5	E				70.0	E		
	EB (Greenbelt Rd)	T	3.2	A				8.0	A				3.3	A				8.0	A		
	EB Overall (Greenbelt Rd)		**11.5**	**B**				**12.6**	**B**				**14.0**	**B**				**12.7**	**B**		
	WB (Greenbelt Rd)	T	3.6	A				4.9	A				3.5	A				5.1	A		
	WB (Greenbelt Rd)	R	0.1	A				1.8	A				0.3	A				1.9	A		
	WB Overall (Greenbelt Rd)		**3.2**	**A**				**4.5**	**A**				**3.2**	**A**				**4.6**	**A**		
	SB (Greenbelt Sta Pkwy)	L	67.1	E				59.9	E				65.8	E				59.8	E		
	SB (Greenbelt Sta Pkwy)	R	46.0	D				47.4	D				44.6	D				47.3	D		
	SB Overall (Greenbelt Sta Pkwy)		**57.5**	**E**				**54.1**	**D**				**56.2**	**E**				**54.0**	**D**		
	Overall		**11.1**	**B**	**988**	**A**	**Pass**	**12.7**	**B**	**1,100**	**B**	**Pass**	**11.7**	**B**	**1,020**	**B**	**Pass**	**12.7**	**B**	**1,101**	**B**	**Pass**

Notes:

AWSC = All-way STOP-Controlled intersection

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left / through / right lanes

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

Delay is Measured in Seconds Per Vehicle.

Red cells denote intersections or approaches operating at unacceptable conditions.

^ Highway Capacity Manual was unable to report accurate delay using default gap acceptance values.

[a] Highway Capacity Software 2010 Roundabout results

[b] Intersection would be included under the Build Condition, but was included as part of the No-build Condition design provided by Renard Development Company, LLC.

5.8.6 Build Condition Queuing Analysis

Synchro™ was used to calculate the 50th percentile queue lengths and SimTraffic™ was used to calculate the 95th percentile queue lengths. The SimTraffic simulations have a statistical accuracy of plus or minus 5.0 percent error for the AM and PM peak hour simulations.

5.8.6.1 Signalized Intersection Operations Analysis

Based on the Synchro™ and SimTraffic™ analysis, the following signalized intersection approaches would experience failing queue lengths in Synchro™ or SimTraffic™ (queue exceeds available lane storage). The lane group within the approach that would be operating under unacceptable conditions is noted in parentheses

- Greenbelt Road (MD 193) and Cherrywood Lane/60th Avenue (Intersection #1)
    - Southbound Cherrywood Lane (all movements) during the PM peak hour
- Kenilworth Avenue/Edmonston Road (MD 201) and Cherrywood Lane (Intersection #11)
    - Southbound Edmonston Road (right turns) during the AM peak hour
- Edmonston Road (MD 201) and Sunnyside Avenue (Intersection #12)
    - Eastbound Sunnyside Avenue (right turns) and southbound Edmonston Road (right turns and through movements) during the AM peak hour
    - Eastbound Sunnyside Avenue (all movements), northbound Edmonston Road (all movements) and southbound Edmonston Road (all movements) during the PM peak hour
- Edmonston Road (MD 201) and Powder Mill Road (Intersection #13)
    - Northbound Edmonston Road (left turns) during the PM peak hour
- Greenbelt Metro Drive and Site North Access (unsignalized in No-build) (Intersection #14)
    - Eastbound Greenbelt Metro Drive (through movements) and northbound site north access (left turns) during the PM peak hour
- Greenbelt Station Bus Bays/Greenbelt Metro Drive and Greenbelt Station Boulevard (Intersection #15)
    - Westbound Greenbelt Metro Drive (left turns) during the AM peak hour
- Greenbelt Station Parkway and North Core Development/Site Northwest Access (Intersection #16)
    - Westbound site northwest access (PM right turns) during the PM peak hour
- Greenbelt Station Parkway and I-95/I-495 Off-ramps/Site South Access/Kiss & Ride (Intersection #18)
    - Eastbound Kiss & Ride (left turns) and eastbound I-95 off ramps (all movements) during the AM peak hour
- Greenbelt Station Parkway and WMATA Garage (Intersection #19)
    - Eastbound WMATA garage (left turns) during the PM peak hour
- Greenbelt Road (MD 193) and Greenbelt Station Parkway (Intersection #21)
    - Eastbound Greenbelt Road (left turns), westbound Greenbelt Road (right turns) and southbound Greenbelt Station Parkway (right turns) during the PM peak hour

5.8.6.2 Unsignalized Intersection Operations Analysis

Four of the six unsignalized intersections would not experience failing queue lengths for the 95th percentile. The intersection of Cherrywood Lane and Ivy Lane (Intersection #5) would experience 95th percentile failing queues on southbound Ivy Lane (combined left, through, and right movements) during the PM peak hour, and the intersection of Cherrywood Lane and Greenbelt Metro Drive would experience 95th percentile failing queues on northbound Cherrywood Lane (combined left and through movements) during the PM peak hour.

5.8.6.3 Complete Intersection Queuing Analysis

This section summarizes the differences in queuing impacts between the Build Condition and the No-build Condition by quantifying the change in intersection queuing failures. Following the summary, this section also includes the complete results of the queuing analysis.

Based on the Synchro™ and SimTraffic™ analysis, 10 signalized and 2 unsignalized intersections would experience queuing lengths that would exceed the available storage capacity. The remaining intersections in the study area would provide sufficient storage for the anticipated demand. Compared to the No-build Condition, the Build Condition would have no change in the number of intersections with failing queues during the AM peak hour and three more intersections would have failing queues during the PM peak hour. In the AM peak hour in the No-build Condition, there would be four intersections with a failing queue approach compared with four in the Build Condition, an increase of zero. In the PM peak hour in the No-build Condition, there would be six intersections with a failing queue approach compared with nine in the Build Condition, an increase of 3.

Table 5-21 provides a summary of the number of intersections that meet the following criteria for approach lane groups in a queue that would change between the No-build and the Build Conditions:

Table 5-21: Queuing Summary Comparing No-build Condition to Build Condition

Type of Change Between Conditions	AM	PM
New Failing Movement	0	3
Additional Failing Movement	1	1
No Change	20	17
Fewer Failing Movements	0	0
No Failing Movements	0	0
Total Signalized and Unsignalized Intersections	**21**	**21**

The results of the No-build Condition compared to the Build Condition queuing analysis for both signalized and unsignalized intersections are presented in table 5-22. Note that the percentile values are expressed in feet, and a car occupies about 25 linear feet of roadway, including the space between cars.

Table 5-22: Comparison of No-build to Build Condition Queuing Analysis

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build Condition			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
1	**Greenbelt Road (MD 193) & Cherrywood Lane/60th Avenue (Signalized)**										
	EB (Greenbelt Rd)	L	350	132	165	240	250	132	161	240	264
	EB (Greenbelt Rd)	TR	1,584	148	128	373	294	148	134	373	307
	WB (Greenbelt Rd)	L	200	43	126	68	137	43	128	69	141
	WB (Greenbelt Rd)	TR	1,336	598	324	208	296	626	336	208	301
	NB (60th Ave)	LTR	320	132	217	154	#357	132	205	154	319
	SB (Cherrywood Ln)	L	350	74	112	172	254	76	112	~204	#403
	SB (Cherrywood Ln)	LT	1,300	75	134	178	315	77	132	~210	621
	SB (Cherrywood Ln)	R	1,300	252	259	653	529	258	250	~796	693
2	**Cherrywood Lane & Breezewood Drive (AWSC)**										
	WB (Breezewood Dr)	LR	573	-	86	-	76	-	83	-	77
	NB (Cherrywood Ln)	T	1,300	-	120	-	162	-	119	-	156
	NB (Cherrywood Ln)	R	1,300	-	81	-	113	-	80	-	116
	SB (Cherrywood Ln)	L	175	-	57	-	65	-	57	-	66
	SB (Cherrywood Ln)	T	2,394	-	73	-	85	-	73	-	99
3	**Cherrywood Lane & Springhill Drive (TWSC)**										
	WB (Springhill Dr)	LR	620	-	90	-	189	-	86	-	246
	NB (Cherrywood Ln)	TR	2,394	-	-	-	3	-	2	-	2
	SB (Cherrywood Ln)	L	350	-	53	-	68	-	52	-	72
4	**Cherrywood Lane & Greenbelt Metro Drive (Roundabout)**										
	EB (Greenbelt Metro Dr)	L	449	-	59	-	109	-	55	-	192
	EB (Greenbelt Metro Dr)	R	250	-	25	-	43	0	18	-	104
	NB (Cherrywood Ln)	LT	111	-	92	-	107	-	94	-	#118
	SB (Cherrywood Ln)	T	1,451	-	42	-	83	0	43	-	86
	SB (Cherrywood Ln)	R	200	-	13	-	10	-	16	-	11
5	**Cherrywood Lane & Ivy Lane (TWSC)**										
	EB (Cherrywood Ln)	LTR	1,451	-	156	-	45	-	162	-	43
	WB (Cherrywood Ln)	L	219	-	35	-	23	-	34	-	23
	WB (Cherrywood Ln)	TR	219	-	12	-	9	-	12	-	5
	NB (Ivy Ln)	LT	485	-	81	-	131	-	85	-	130
	NB (Ivy Ln)	R	485	-	38	-	53	-	37	-	52
	SB (Ivy Ln)	LTR	223	-	66	-	#287	-	59	-	#288

Table 5-22: Comparison of No-build to Build Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build Condition			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
6	**Greenbelt Road (MD 193) & 62 Avenue/Beltway Plaza Driveway (Signalized)**										
	EB (Greenbelt Rd)	L	250	0	27	9	63	0	25	10	68
	EB (Greenbelt Rd)	TR	1,336	63	56	511	221	64	49	526	229
	WB (Greenbelt Rd)	L	250	9	53	19	123	9	52	19	106
	WB (Greenbelt Rd)	T	1,038	190	168	373	291	197	167	375	287
	WB (Greenbelt Rd)	R	1,038	0	39	3	96	0	36	3	103
	NB (62th Ave)	LTR	697	25	96	115	202	25	93	115	205
	SB (Beltway Plaza Drwy)	L	350	16	14	173	238	16	7	173	251
	SB (Beltway Plaza Drwy)	LT	472	17	69	172	268	17	65	172	272
	SB (Beltway Plaza Drwy)	R	350	0	23	0	51	0	22	0	50
7	**Kenilworth Avenue (MD 201) & I-95/I-495 SB Off-ramp (Signalized)**										
	EB (I-95/I-495 SB Off-ramp)	L	531	112	300	97	211	112	303	97	209
	EB (I-95/I-495 SB Off-ramp)	R	736	0	394	0	2	0	337	0	-
	NB (Kenilworth Ave)	T	1,263	46	90	66	116	47	89	66	117
	SB (Kenilworth Ave)	T	574	229	180	56	115	229	179	57	118
8	**Kenilworth Avenue (MD 201) & I-95/I-495 NB Off-ramp (Signalized)**										
	WB (I-95/I-495 NB Off-ramp)	L	885	223	245	160	222	223	244	160	228
	WB (I-95/I-495 NB Off-ramp)	R	835	217	152	61	96	217	155	61	89
	NB (Kenilworth Ave)	T	345	116	131	49	94	119	132	49	101
	SB (Kenilworth Ave)	T	199	56	154	77	129	56	156	78	131
9	**Kenilworth Avenue (MD 201) & Crescent Road/Maryland SHA Office (Signalized)**										
	EB (Maryland SHA Office)	LTR	250	1	36	3	48	1	38	3	48
	WB (Crescent Rd)	LT	441	168	254	79	145	168	263	79	149
	WB (Crescent Rd)	R	250	0	133	0	71	0	135	0	78
	NB (Kenilworth Ave)	L	250	28	85	9	36	28	86	9	40
	NB (Kenilworth Ave)	T	286	234	281	117	160	234	282	117	162
	NB (Kenilworth Ave)	R	250	9	114	2	35	9	122	2	43
	SB (Kenilworth Ave)	L	300	64	110	128	201	64	110	131	201
	SB (Kenilworth Ave)	T	793	45	156	60	446	45	155	60	452
	SB (Kenilworth Ave)	R	R	0	10	0	194	0	11	0	185
10	**Kenilworth Avenue (MD 201) & Ivy Lane (Signalized)**										
	EB (Ivy Ln)	R	-	0	-	0	-	0	-	0	-
	NB (Kenilworth Ave)	L	547	88	134	21	59	87	136	21	59
	NB (Kenilworth Ave)	T	-	45	64	29	-	45	110	29	-
	SB (Kenilworth Ave)	T	1,198	4	93	15	101	4	96	16	108
	SB (Kenilworth Ave)	R	-	0	-	0	-	0	-	0	-

Table 5-22: Comparison of No-build to Build Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build Condition			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
11	**Kenilworth Avenue/Edmonston Road (MD 201) & Cherrywood Lane (Signalized)**										
	EB (Cherrywood Ln)	L	777	68	120	129	165	69	115	139	177
	EB (Cherrywood Ln)	R	1,304	0	65	0	200	0	62	0	194
	NB (Kenilworth Ave)	L	750	81	367	18	148	81	391	15	154
	NB (Kenilworth Ave)	T	1,198	2	59	6	76	2	66	6	69
	SB (Edmonston Rd)	T	594	307	301	212	204	311	306	217	198
	SB (Edmonston Rd)	R	250	31	#265	0	89	46	#285	0	83
12	**Edmonston Road (MD 201) & Sunnyside Avenue (Signalized)**										
	EB (Sunnyside Ave)	L	965	182	555	320	#1234	182	484	320	#1222
	EB (Sunnyside Ave)	R	350	332	#421	455	#425	342	#421	455	#447
	NB (Edmonston Rd)	L	450	362	387	268	#602	378	406	268	#605
	NB (Edmonston Rd)	T	1,381	249	259	809	#1865	250	267	876	#1905
	SB (Edmonston Rd)	T	1,554	1336	#1629	1058	#1726	1442	#1942	1058	#1647
	SB (Edmonston Rd)	R	250	23	#293	14	#336	25	#310	14	#337
13	**Edmonston Road (MD 201) & Powder Mill Road (Signalized)**										
	EB (Powder Mill Rd)	L	250	43	124	414	237	44	123	79	243
	EB (Powder Mill Rd)	T	903	244	269	0	457	245	298	414	496
	EB (Powder Mill Rd)	R	500	0	83	0	154	0	96	0	191
	WB (Powder Mill Rd)	L	250	114	156	74	119	114	150	74	111
	WB (Powder Mill Rd)	T	699	176	214	129	163	176	212	129	171
	WB (Powder Mill Rd)	R	100	0	100	0	62	0	96	0	65
	NB (Edmonston Rd)	L	400	513	364	~615	324	523	370	~679	333
	NB (Edmonston Rd)	T	640	274	246	19	297	274	257	578	296
	NB (Edmonston Rd)	R	275	0	20	64	96	0	28	19	96
	SB (Edmonston Rd)	L	275	21	104	0	140	21	76	64	132
	SB (Edmonston Rd)	TR	822	324	301	0	310	332	307	345	300
14	**Greenbelt Metro Drive & Site North Access (Signalized)** [a]										
	EB (Greenbelt Metro Dr)	T	216	N/A	N/A	N/A	N/A	41	75	215	#283
	WB (Greenbelt Metro Dr)	L	-	N/A	N/A	N/A	N/A	-	-	-	-
	WB (Greenbelt Metro Dr)	T	244	N/A	N/A	N/A	N/A	82	124	95	149
	NB (Site North Access)	L	234	-	-	-	-	10	51	163	#245
	NB (Site North Access)	R	234	N/A	N/A	N/A	N/A	0	32	0	115

Table 5-22: Comparison of No-build to Build Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build Condition			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
15	**Greenbelt Station Bus Bays/Greenbelt Metro Drive & Greenbelt Station Parkway (Signalized)**										
	EB (Greenbelt Sta Bus Bays	LT	216	22	59	16	54	22	60	16	58
	EB (Greenbelt Sta Bus Bays	R	-	-	-	-	-	-	-	-	-
	WB (Greenbelt Metro Dr)	L	366	412	#446	169	250	442	#465	163	253
	WB (Greenbelt Metro Dr)	T	366	14	45	15	57	14	41	14	55
	WB (Greenbelt Metro Dr)	R	275	0	-	0	-	0	-	60	114
	NB (Greenbelt Sta Pkwy)	L	250	-	-	0	4	-	-	0	2
	NB (Greenbelt Sta Pkwy)	T	243	100	102	50	84	129	-	64	-
	NB (Greenbelt Sta Pkwy)	R	243	31	-	12	11	45	98	30	97
16	**Greenbelt Station Parkway & North Core Development/Site Northwest Access (Signalized)**										
	EB (North Core Dev)	L	179	38	80	121	164	38	85	103	176
	EB (North Core Dev)	TR	179	0	36	0	63	0	36	0	100
	WB (Site Northwest Access)	LTR (AM)	-	-	-	-	-	0	53	-	-
	WB (Site Northwest Access)	LT (PM)	-	-	-	-	-	-	-	-	-
	WB (Site Northwest Access)	R (PM)	-	-	-	-	-	-	-	267	#265
	NB (Greenbelt Sta Pkwy)	L	505	28	197	33	131	56	183	44	137
	NB (Greenbelt Sta Pkwy)	TR	505	28	107	67	228	78	166	87	206
	SB (Greenbelt Sta Pkwy)	TR	266	0	22	0	13	0	23	0	13
17	**Greenbelt Station Parkway & Residential Access to 500 Units (TWSC)**										
	EB (Residential Access)	R	174	-	59	-	49	-	63	-	51
	NB (Greenbelt Sta Pkwy)	T	465	-	3	-	302	-	7	-	229
18	**Greenbelt Station Parkway & I-95/I-495 Off-ramps/Site South Access/Kiss & Ride (Signalized)**										
	EB (I-95 Off-ramps)	L	229	238	223	187	134	~797	#2534	196	164
	EB (I-95 Off-ramps)	LTR	229	129	222	21	153	~666	#2456	30	155
	EB (Kiss and Ride)	L	188	229	#258	116	174	229	#262	117	179
	WB (Site South Access)	R	407	6	27	118	160	7	25	118	176
	NB (Greenbelt Sta Pkwy)	L	375	24	59	35	76	24	56	35	78
	NB (Greenbelt Sta Pkwy)	T	530	325	86	110	87	356	87	111	88
	SB (Greenbelt Sta Pkwy)	L	400	0	120	0	54	176	172	0	62
	SB (Greenbelt Sta Pkwy)	TR	465	0	73	28	93	3	77	28	83

Table 5-22: Comparison of No-build to Build Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build Condition			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
19	**Greenbelt Station Parkway & WMATA Garage (Signalized)**										
	EB (WMATA Garage)	L	150	7	30	100	#158	7	29	100	#162
	EB (WMATA Garage)	R	290	0	24	0	63	0	23	0	85
	NB (Greenbelt Sta Pkwy)	LT	330	358	183	157	80	409	176	157	81
	NB (Greenbelt Sta Pkwy)	TR	330	4	145	48	99	4	140	48	88
	SB (Greenbelt Sta Pkwy)	T	162	141	68	248	152	161	58	240	155
	SB (Greenbelt Sta Pkwy)	R	162	23	14	0	2	32	11	0	2
20	**Greenbelt Station Parkway & Residential Access to 300 Units (TWSC)**										
	EB (Residential Access)	LR	224	-	64	-	44	-	60	-	42
	NB (Greenbelt Sta Pkwy)	LT	345	-	0	-	0	-	0	-	0
	SB (Greenbelt Sta Pkwy)	TR	350	-	5	-	6	-	-	-	5
21	**Greenbelt Road (MD 193) & Greenbelt Station Parkway (Signalized)**										
	EB (Greenbelt Rd)	L	67	95	144	97	#142	124	180	98	#144
	EB (Greenbelt Rd)	T	1,008	84	95	360	233	84	89	360	227
	WB (Greenbelt Rd)	T	1,584	117	130	165	199	116	213	173	198
	WB (Greenbelt Rd)	R	150	0	71	19	#167	2	73	20	#177
	SB (Greenbelt Sta Pkwy)	L	524	115	162	125	185	115	151	125	191
	SB (Greenbelt Sta Pkwy)	R	225	165	209	184	#242	167	208	185	#235

Notes:

~ 50th percentile volume exceeds capacity, queue is theoretically infinite.

95th percentile volume exceeds capacity, queue may be longer.

m Volume for 95th percentile queue is metered by upstream signal. Due to upstream metering, the 95th percentile queue may be less than the 50th percentile queue.

AWSC = All-way STOP-Controlled intersection

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left / through / right lanes

TWSC = Two-way STOP-Controlled intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

[a] Intersection would be included under the Build Condition, but was included as part of the No-build Condition design provided by Renard Development Company, LLC.

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5.8.7 Overall Traffic Assessment

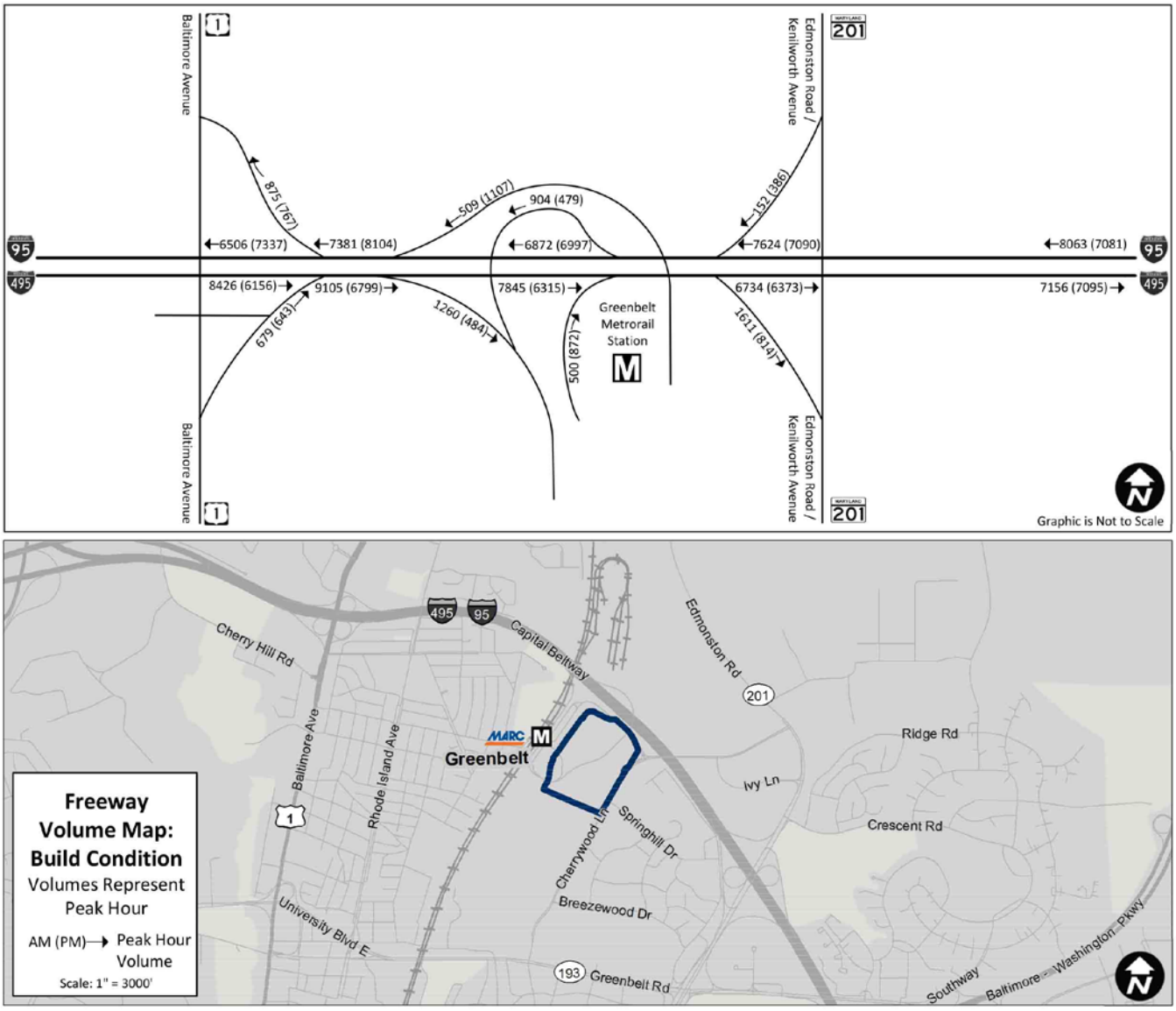
Overall, the PM peak hour would experience isolated intersection impacts at the Edmonston Road (MD 201) at Powder Mill Road, Edmonston Road (MD 201) and Sunnyside Avenue, and Cherrywood Lane and Ivy Lane intersection (Ivy Lane approaches only). Together these conditions would result in direct, long-term, adverse impacts at intersections.

Because the intersections along Edmonston Road at Sunnyside Avenue and Powder Mill Road are forecasted to be failing during the No-build Condition, adding construction-related trips along this route caused by trucks, employees, and equipment would result in isolated impacts. These conditions would result in direct, short-term, adverse impacts during the construction period.

5.8.8 Build Condition Freeway Volumes

Although freeway analysis was not performed for the Build Condition, freeway ramp volumes are included in figure 5-10 to allow a comparison to the Existing Condition, No-build Condition, and Build with Mitigation Condition freeway ramp volumes presented in Sections 3.7, 4.8, and 6.6, respectively. Full analysis of the freeway volumes is included in the Build with Mitigation Condition in Section 6.6.

Figure 5-10: Build Condition Freeway Volumes



5.9 Transportation Demand Management

TDM is a set of strategies, programs, services, and physical elements that influence travel behavior by mode, frequency, time, route, or trip length in order to help achieve highly efficient and sustainable use of transportation facilities (DDOT 2010, p.5). TDM measures for the Greenbelt Build with Mitigation Condition would be developed as part of the Final EIS if the Greenbelt site is chosen as the preferred consolidation location for the FBI HQ. The TDM measures would encourage the reduction of SOV trips by "focusing the demand for transportation services on alternative modes and providing the public with the incentives as well as information to use these alternatives."

The introduction of TDM measures would serve to ensure the transportation mode splits planned in this study were achieved as well as serve to mitigate travel mode, frequency, time, route, and/or trip length associated with future trips of the consolidated FBI HQ.

6.0 Mitigation Measures

To reduce impacts on the transportation system caused as a result of the proposed action—consolidation of the FBI HQ at the Greenbelt site, mitigation measures are recommended in this section for each mode of transportation analyzed. Also included is a sample of Transportation Demand Management (TDM) measures to encourage non-SOV travel. Overall, the Greenbelt site requires moderate mitigation to reduce direct impacts of the proposed action.

6.1 Pedestrian Network

No pedestrian mitigation is necessary under the Greenbelt Build with Mitigation Condition because any pedestrian improvements outside of the Greenbelt site would be built as part of the Greenbelt Station development project.

When compared to the Build Condition, there would be no difference in the long-term or short-term pedestrian network impacts under the Build with Mitigation Condition, because the recommended mitigation measures would not change the proposed pedestrian network. Therefore, under the Build with Mitigation Condition, there would continue to be direct, long-term, beneficial impacts to the pedestrian network and no measureable direct, shirt-term impacts to the pedestrian network because of construction.

6.2 Bicycles

No mitigation is recommended for the bicycle network in the study area. The site currently has adequate bicycle facilities on Greenbelt Metro Drive and Cherrywood Lane, along with a connection to Lackawanna Street on the west side of the Greenbelt Metro Station. The proposed bicycle lanes on Greenbelt Station Parkway, to be built as part of the No-build Condition, would augment the existing network of bicycle facilities around the site.

When compared to the Build Condition, there would be no difference in the long-term or short-term bicycle network impacts under the Build with Mitigation Condition, because the recommended mitigation measures would not change the proposed bicycle network. Therefore, under the Build with Mitigation Condition, there would continue to be no measurable direct, long-term or short-term impacts to the study area bicycle network from the proposed action or from construction, respectively.

6.3 Public Transit

No public transit mitigation is necessary under the Greenbelt Build with Mitigation Condition.

When compared to the Build Condition, there would be no difference in long-term public transit capacity impacts under the Build with Mitigation Condition. Therefore, there would continue to be no measureable direct, long-term impacts to public transit capacity. However, the bus operation delays along Edmonston Road (three bus routes) would be improved resulting in direct, long-term beneficial impacts. During construction, when compared to the Build Condition, there would be worse public transit impacts under the Build with Mitigation Condition, changing from direct, short-term, adverse impacts to direct, short-term, major adverse impacts caused by construction vehicles blocking some or all of the lanes on the road and intermittent road closures along Edmonston Road and 60th Avenue.

6.4 Parking

As mentioned in the Build Condition section, parking impacts would largely be addressed through development and implementation of a Transportation Management Plan (TMP), which would include preferred strategies for discouraging employees from parking on local streets. Because the TMP would be implemented as part of the

Build Condition, there would be no changes in parking impacts between the Build and Build with Mitigation Conditions.

When compared to the Build Condition, there would be no change in long-term parking impacts; therefore there would continue to be no measurable direct, long-term impacts to parking. Compared to the Build Condition, there would be no difference in the short-term construction parking impacts under the Build with Mitigation Condition. There would continue to be no measurable direct, short-term parking impacts because the recommended mitigation measures would not impact parking during the construction period.

6.5 Truck Access

No mitigation is recommended for truck access. Note that the Build Condition includes proper signing and communication of truck access restrictions to alleviate impacts to truck access.

When compared to the Build Condition, there would be no difference in the long-term or short-term truck access impacts under the Build with Mitigation Condition, because the measures would not change the truck access conditions. Therefore, there would continue to be no measurable direct, long-term or short-term truck access impacts during operation of the facility or during construction, respectively.

6.6 Traffic Analysis

6.6.1 Development of Mitigated Network

Based on the Build Condition traffic operations and queueing analysis, most of the intersections would not fail (defined in the Section 3.7.1, *Existing Condition* section) or require mitigation; therefore a second DTA was not necessary. In addition, the principal decision point would be at the Greenbelt Station Parkway and I-95 off-ramp where FBI inbound vehicles would either drive straight into the Site South Access or turn left and enter through the Site Northwest Access. The DTA provided a balanced vehicle flow between the two ECFs and would be initially used to measure the ECF queuing impacts.

6.6.2 Recommended Mitigation Measures

Based on the DTA results from the Build Condition, the resulting traffic volumes were entered into Synchro™ to determine the study area intersection operations and queuing. Each intersection that had LOS degradation from a passing LOS (A-D) to a failing LOS (E or F) by lane group (right turns, through movements, or left turns) when compared to the No-build Condition was mitigated by one of the following methods:

- Optimizing the existing traffic signal (change the amount of seconds of green to each approach)
- Coordinating a corridor of traffic signals
- Revising the existing lane geometry (number of right versus through versus left-turning lanes)
- Adding new turning lanes
- Adding through lanes

Because M-NCPPC requires each intersection to be analyzed based on the CLV method, each of the intersection geometry and Build with Mitigation vehicle volumes were entered into the CLV worksheet to ensure the proposed recommended mitigation also resulted in a passing CLV LOS. Similar to the HCM method, M-NCPPC requires that failing intersections be improved to better condition than the No-build Condition (the difference between the failing CLV and mitigated CLV must be reduced by at least 150 percent of the delta between the failing CLV and No-build CLV).

A list of mitigation measures was developed through an iterative process of testing the different improvement strategies, starting with optimizing the traffic signals and progressing to adding lanes if warranted. The recommended roadway improvements include external roadway mitigation measures that support the revised Greenbelt conceptual site plan. If implemented, the external roadway mitigations would improve the traffic operations at all study area intersections to a passing LOS (both HCM-based and CLV-based) or, if failing, would be equal to or better than the No-build Condition operations. The recommended mitigations would also result in no vehicle queues beyond the available storage capacity, or if beyond the storage capacity, would be no greater than 150 feet longer than the queues measured for the No-build Condition. An acceptable queue length increase is not cited in the VDOT Traffic Impact Analysis Regulations; therefore, the 150 feet is referenced from the DDOT Comprehensive Transportation Review Requirements guidance and provides a reasonable increase (approximately 6 vehicles or less) (DDOT 2012).

Table 6-1 shows the locations of the mitigation measures. Figure 6-1 shows the locations of the mitigation measures, figure 6-2 shows the lane geometry with the mitigation in place, and figure 6-3 shows the AM peak hour inbound and PM peak hour outbound FBI vehicle trip paths.

Table 6-1: Recommended Mitigation Measures

Map ID	Mitigation	Strip Land Taking (Approximate Linear Feet)
A	**Edmonston Road (MD 201) and Powder Mill Road**	
	• For the Edmonston Road northbound approach, create a new 400-foot left-turn lane and lengthen the right turn-lane by 50 feet resulting in a 325-foot right-tune lane, resulting in two left-turn lanes, one through lane, and one right-turn lane. • Extend the existing northbound left-turn lane back to the previous intersection at Sunnyside Road resulting in widening the northbound direction by one lane. • Add a second departing lane totaling approximately 700 feet along westbound Powder Mill Road resulting in two westbound travel lanes for 700 feet, • Optimize the traffic signal for AM and PM peak periods.	3,100
B	**Edmonston Road (MD 201) and Sunnyside Road**	
	• For the Edmonston Road northbound approach, create a new through lane extending back 450 feet to match the left-turn lane distance resulting in one left-turn lane and two through lanes. • For the Edmonston Road southbound approach, create a new through lane extending back 600 feet resulting in two through lanes and one right-turn lane. • Add a second departing lane totaling approximately 1,500 feet along southbound Edmonston Road resulting in two southbound travel lanes for 1,500 feet. • Optimize the traffic signal for AM and PM peak periods.	2,550
C	**Greenbelt Road (MD 193) and Cherrywood Lane/60th Avenue**	
	• For the 60th Avenue northbound approach, create a new 120-foot lane resulting in one left-turn lane and one shared through/right turn lane. • Optimize the traffic signal for AM and PM peak periods and coordinate timings with nearby key intersections for AM and PM peak periods.	None

Table 6-1: Recommended Mitigation Measures (continued)

Map ID	Mitigation	Strip Land Taking (Approximate Linear Feet)
D	**Greenbelt Road (MD 193) and Greenbelt Station Parkway**	
	• Coordinate timings with nearby key intersections for the AM peak period.	None
E	**Greenbelt Station Parkway and WMATA Garage**	
	• Optimize the traffic signal for AM and PM peak periods and coordinate timings with nearby key intersections for AM and PM peak periods.	None
F	**Greenbelt Station Parkway and I-95/I-495 off-ramp/Site South Access**	
	• For the Greenbelt Metro Station Kiss & Ride approach, revise the planned roadway improvement design to include a second lane totaling 200 feet (50 feet more if space exists). • Optimize the traffic signal for AM and PM peak periods and coordinate timings with nearby key intersections for AM and PM peak periods.	None
G	**Greenbelt Station Parkway and North Core Mixed Use/Site Northwest Access**	
	• Optimize the traffic signal for AM and PM peak periods and coordinate timings with nearby key intersections for AM and PM peak periods.	None
H	**Greenbelt Station Parkway and Greenbelt Metro Drive**	
	• Optimize the traffic signal for AM and PM peak periods and coordinate timings with nearby key intersections for AM and PM peak periods.	None
I	**Greenbelt Metro Drive and Site North Access**	
	• Install a traffic signal. • Add a second departing lane approximately 500 feet along westbound Greenbelt Metro Drive connecting into the left-turn lane at the next intersection. • Optimize the traffic signal for AM and PM peak periods.	None
J	**I-95/I-495 off-ramp from the Interstates to Greenbelt Station Parkway**	
	• Revise the planned roadway improvement design to stripe the exit ramp for the right lane to lead directly into the WMATA Garage, the center lane to lead to the right lane at the Greenbelt Station Parkway intersection, and the left lane to service the Kiss & Ride and center and left lanes at the Greenbelt Station Parkway intersection.	None

Figure 6-1: Build with Mitigation Condition Improvement Locations

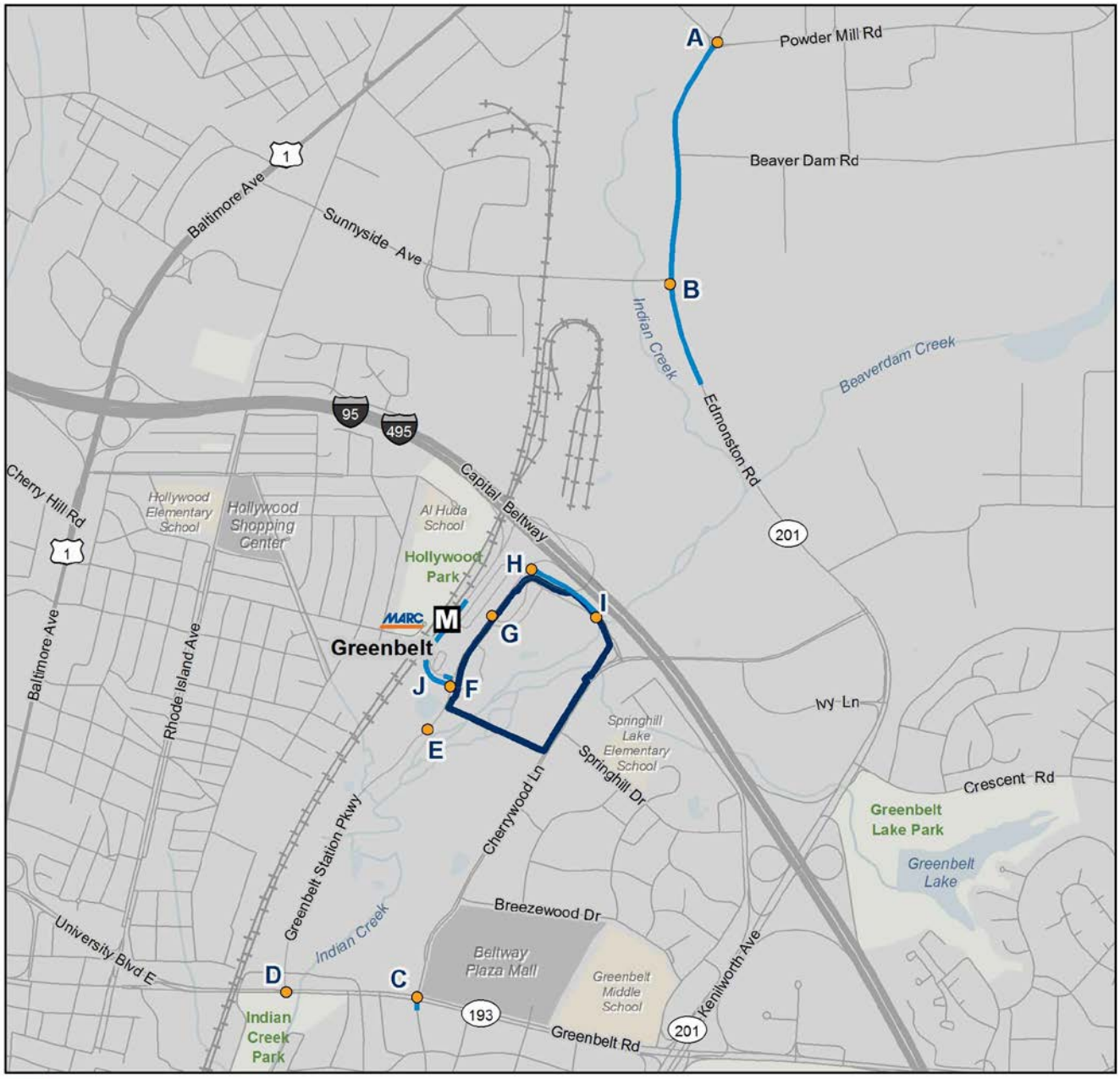


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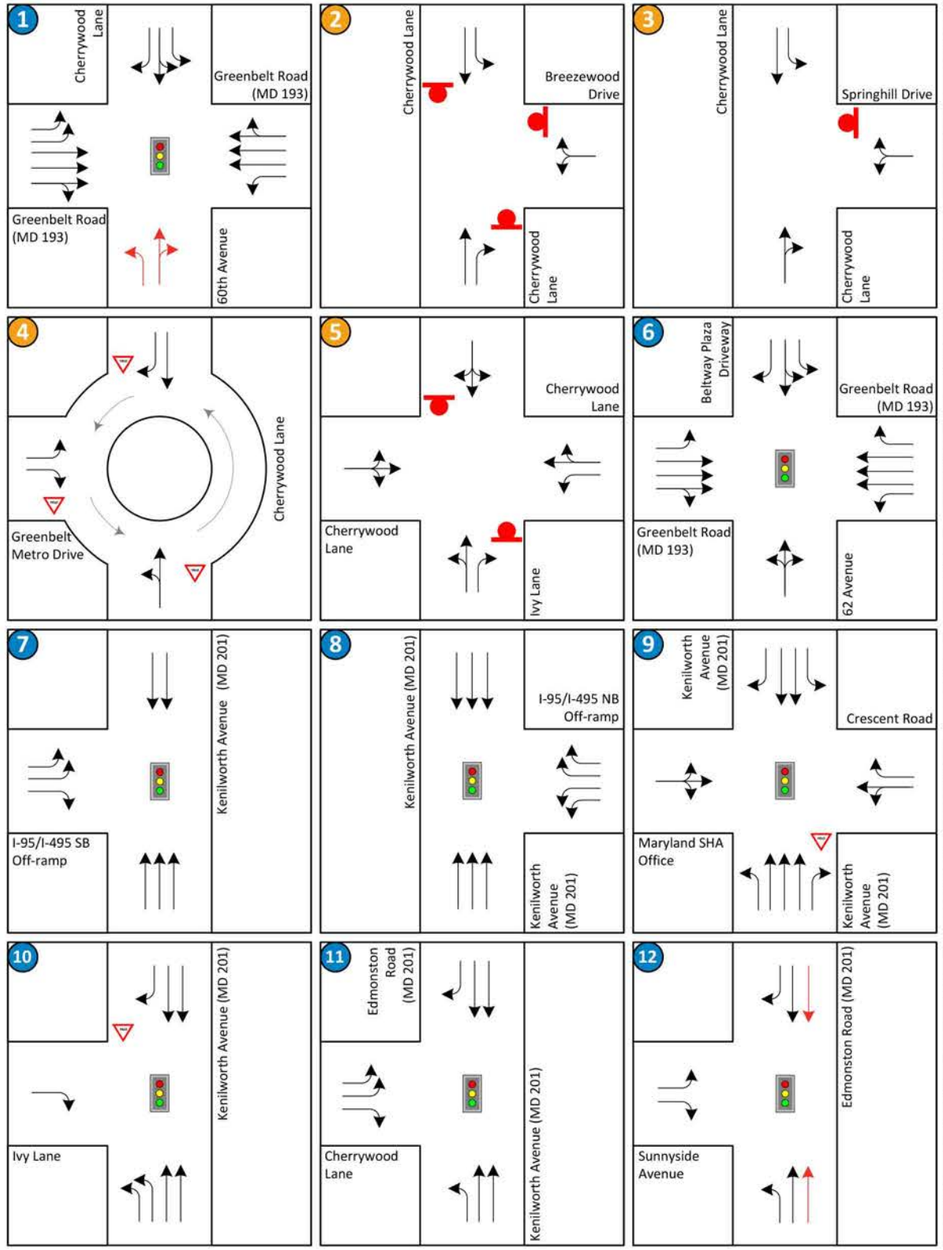
Figure 6-2: Build with Mitigation Condition Lane Geometry



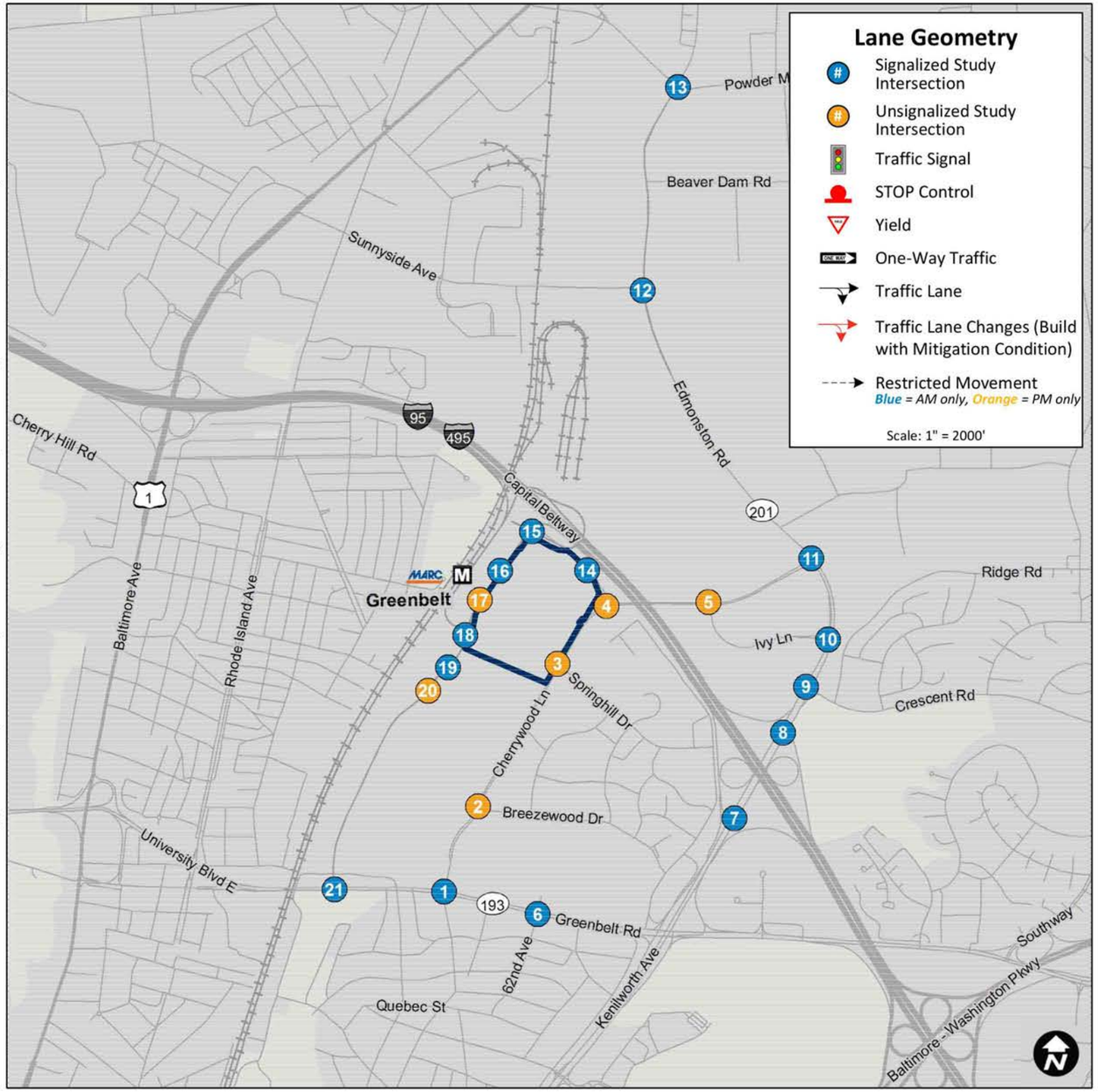
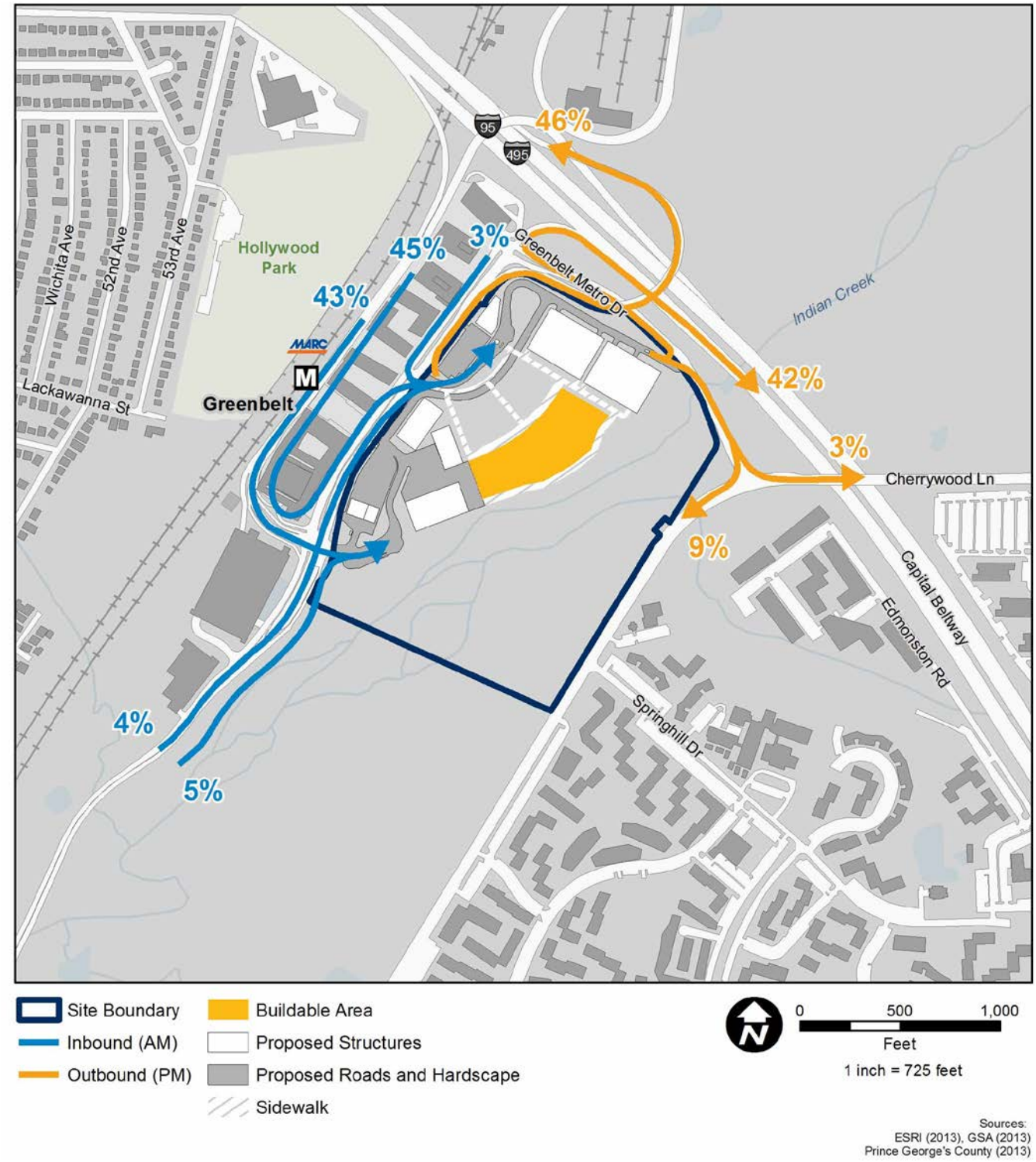


Figure 6-2: Build with Mitigation Condition Lane Geometry (continued)

Figure 6-3: AM Peak Hour Inbound and PM Peak Hour Outbound FBI Vehicle Trip Paths



6.6.3 Land Use Impact Summary

This section references the Prince George's County internet-based PGAtlas tool to provide an estimate of property impacts (M-NCPPC 2012b). Several of the proposed recommended mitigation measures might require property strip takings at two intersections: Edmonston Road at Sunnyside Avenue and Edmonston Road and Powder Mill Road. The Edmonston Road and Sunnyside Avenue intersection mitigation measures would impact the northbound direction beginning 450 feet south of the intersection and continuing 2,950 feet north leading into the intersection at Powder Mill Road. Measures would also include a new lane added to the southbound direction beginning 600 feet north of the intersection and continuing 2,100 feet south.

The Edmonston Road at Powder Mill Road mitigation measures would impact the northbound approach and westbound departing segments. The northbound approach impact would include 400 feet as part of second left-turn lane, and the westbound departing segment would include a 200-foot stretch where the county right-of-way ownership line narrows bordering on the edge of the existing pavement.

There would be four parcels impacted, all tax-exempt-status properties. One property is privately owned, and the other three properties are federally owned. Note that these potential impacts are based on conceptual roadway changes. During the design phase, the property impacts would be more defined to identify the total square acres impacted and design measures that could be employed to lessen the impact, such as narrowing travel lanes or shifting the roadway alignment.

6.6.4 Intersection Operations Analysis

Synchro™ was used to calculate the vehicle delay and LOS operation based on the HCM 2000 method for each study area intersection. Custom designed Excel sheets were used to calculate the LOS operation based on the CLV method. Based on the Synchro™ and CLV-based Excel worksheet analysis,

6.6.4.1 Signalized Intersection Operations Analysis

Based on the Synchro™ and CLV-based Excel worksheet analysis, all but one signalized study area intersection would operate at acceptable overall conditions during the morning and afternoon peak hours. The following intersection in the study area would operate with overall unacceptable conditions, which include LOS E or LOS F using HCM 2000 method or LOS F using the CLV method:

- Edmonston Road (MD 201) and Powder Mill Road (Intersection #13) would operate at CLV F during the PM peak hour

Note that the Build with Mitigation Condition would result in a better operate than the No-build Condition. The Build with Mitigation Condition CLV would decrease when compared to the No-build Condition CLV by a CLV of 224, a 12 percent decrease.

Compared to No-build Condition, one fewer intersection would fail overall, resulting in one failure in the PM peak hour. Based on the Synchro™ analysis, there would be no signalized intersection that would have lane groups or overall approaches with LOS degradation from an acceptable condition (LOS A through LOS D) to an unacceptable condition (LOS E or LOS F) when compared to the No-build Condition during the morning or afternoon peak hours.

6.6.4.2 Unsignalized Intersection Operations Analysis

Based on the Synchro™ analysis, the following two unsignalized intersections would have lane groups or overall approaches with LOS degradation from an acceptable condition (LOS A through LOS D) to an unacceptable

condition (LOS E or LOS F) when compared to the No-build Condition during the morning or afternoon peak hours:

- Cherrywood Lane and Springhill Drive (Intersection #3) would result in the Springhill Drive (minor approach) operating at a worse LOS F than the No-build Condition (average control delay would increase by 47.9 seconds)

  Note that this intersection was analyzed using the CLV method and resulted in a CLV of 893; therefore, the intersection does not require further study (based on the Prince George's County Guidelines outlining a second test for HCM-based failing unsignalized intersection approaches where the CLV-based method should be analyzed to determine if the results are less than CLV of 1,150).

- Cherrywood Lane and Ivy Lane (Intersection #5) would result in the Ivy Lane (minor approach) operating at a worse LOS F than the No-build Condition (average control delay would increase by 40.9 seconds)

  Note that this intersection was analyzed using the CLV method and resulted in a CLV of 1,115; therefore, the intersection does not require further study (based on the Prince George's County Guidelines outlining a second test for HCM-based failing unsignalized intersection approaches where the CLV-based method should be analyzed to determine if the results are less than a CLV of 1,150).

  - Note that the minor street failing traffic operations are due to the proposed Capital Office Park development located north of Cherrywood Lane, which elevated the operations from passing during the Existing Condition to failing operations during the No-build Condition.

6.6.4.3 Complete Intersection Operations Analysis

The average LOS for the various approaches to the intersections and the overall intersection LOS grades for the Build with Mitigation Condition are depicted in figures 6-4 and 6-5 for the AM and PM peak hours, respectively. Table 6-1 shows the results of the LOS capacity analysis and the intersection projected delay under the No-build Condition compared to the Build with Mitigation Condition during the AM and PM peak hours.

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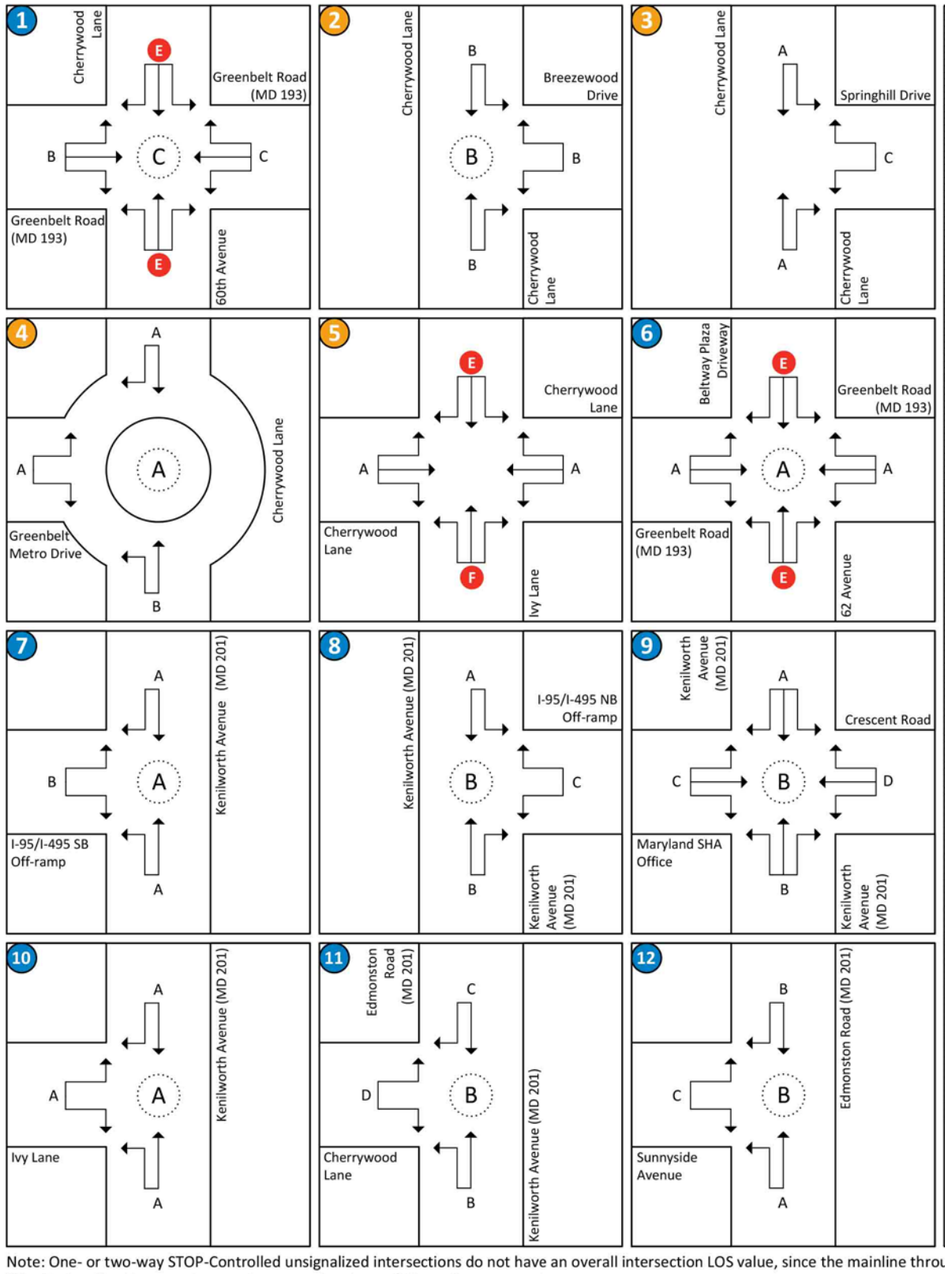
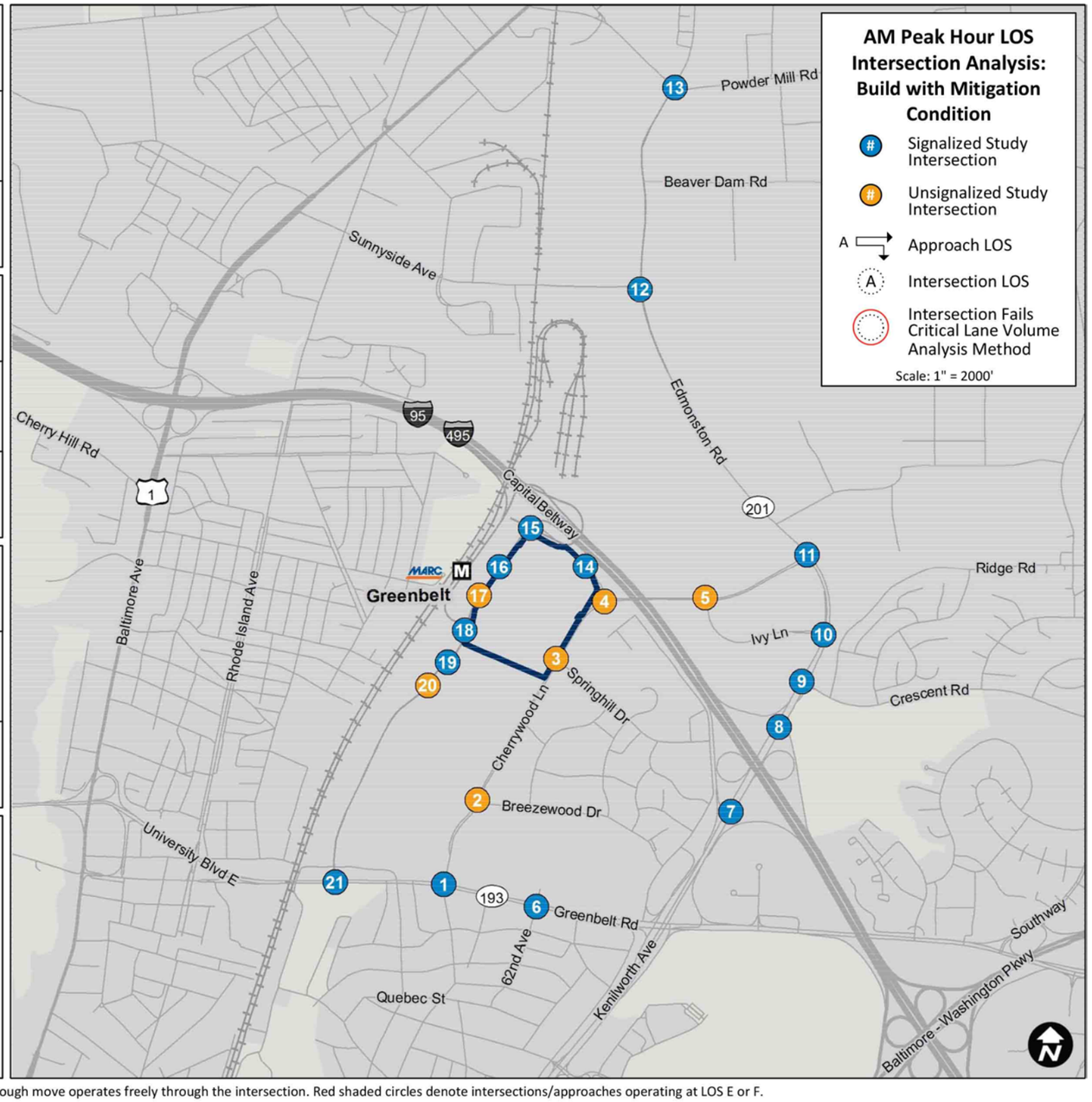
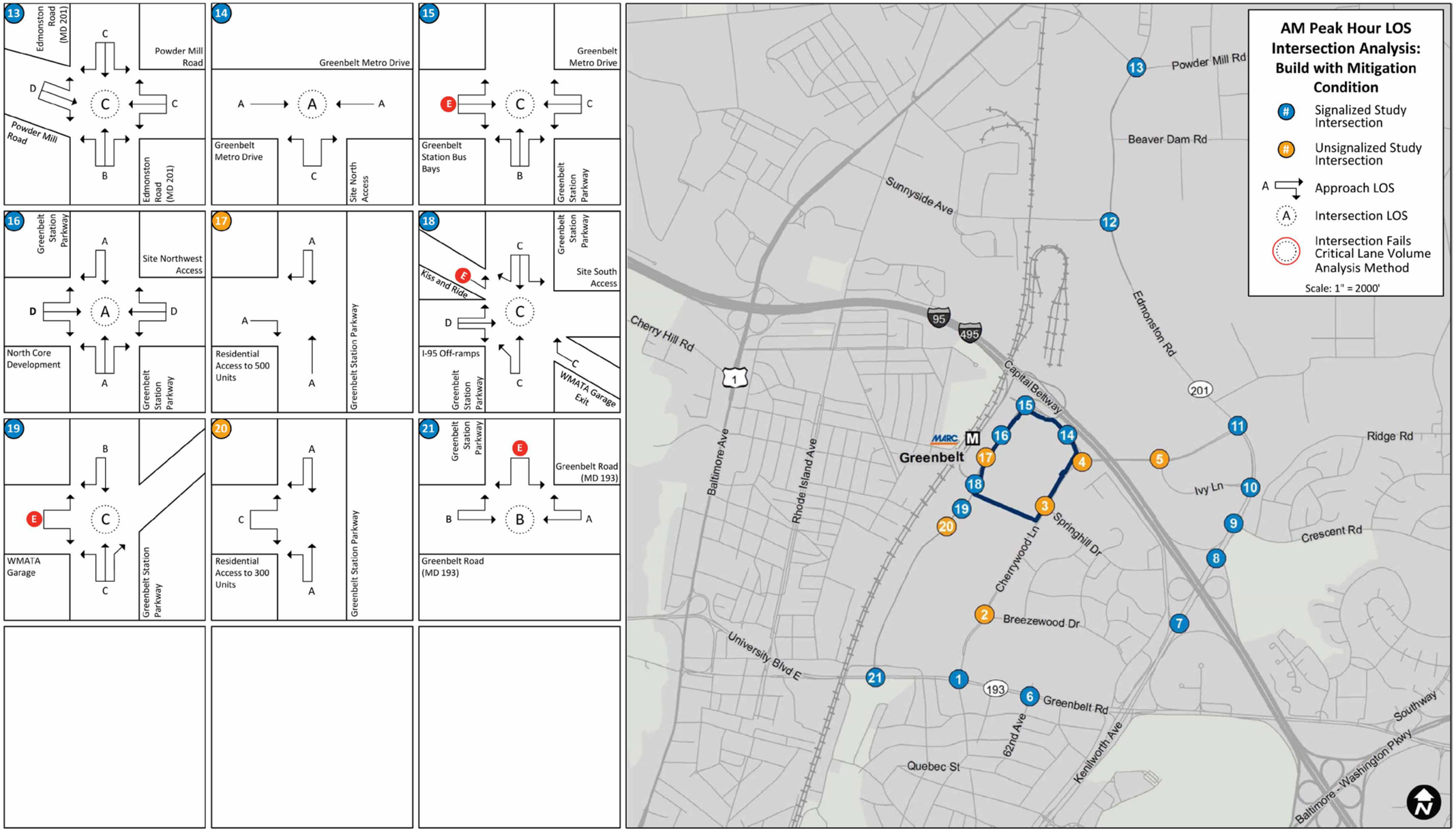
Figure 6-4: Build with Mitigation Condition Intersection LOS for AM Peak Hour





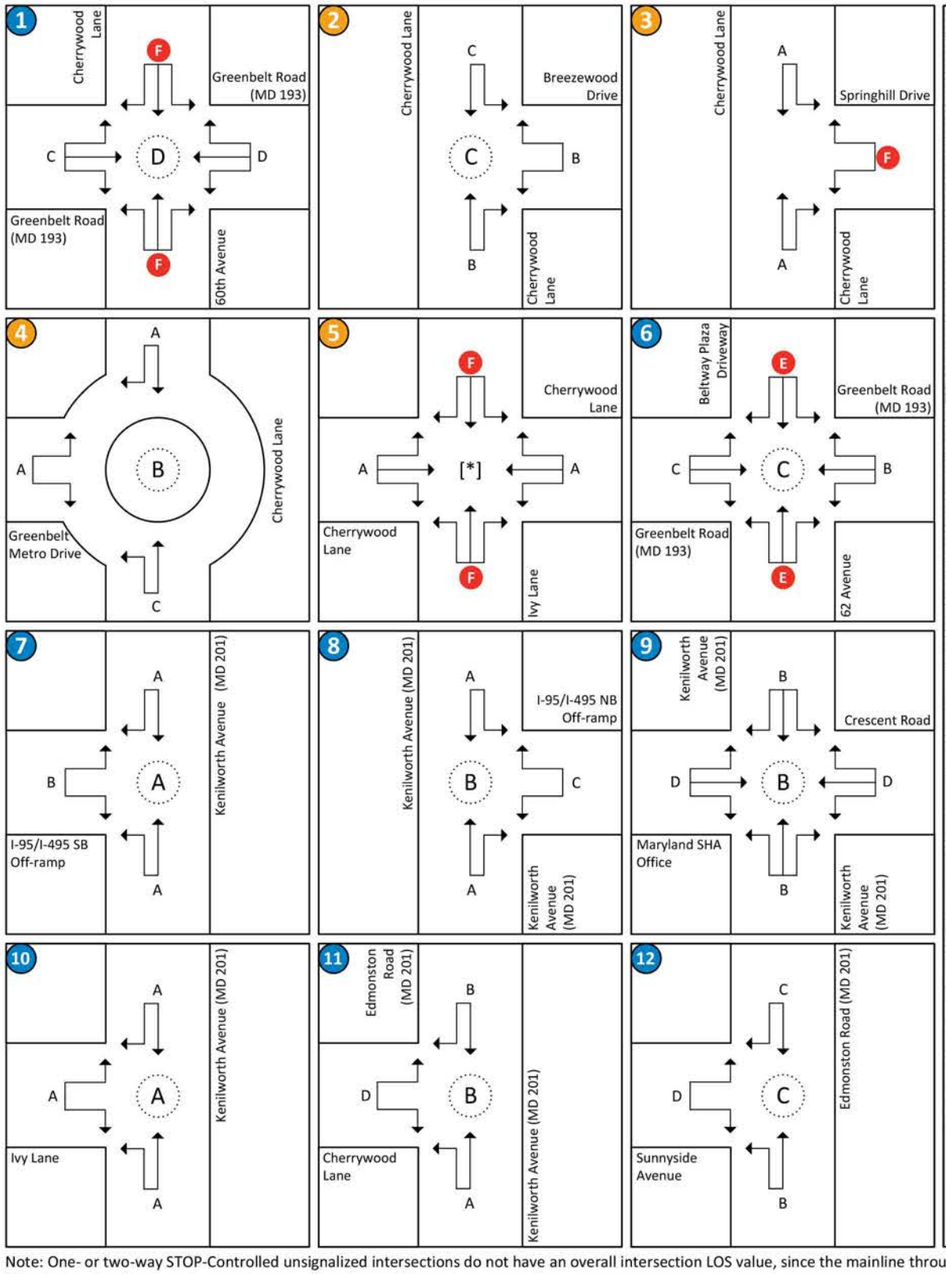
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.

Figure 6-4: Build with Mitigation Condition Intersection LOS for AM Peak Hour (continued)



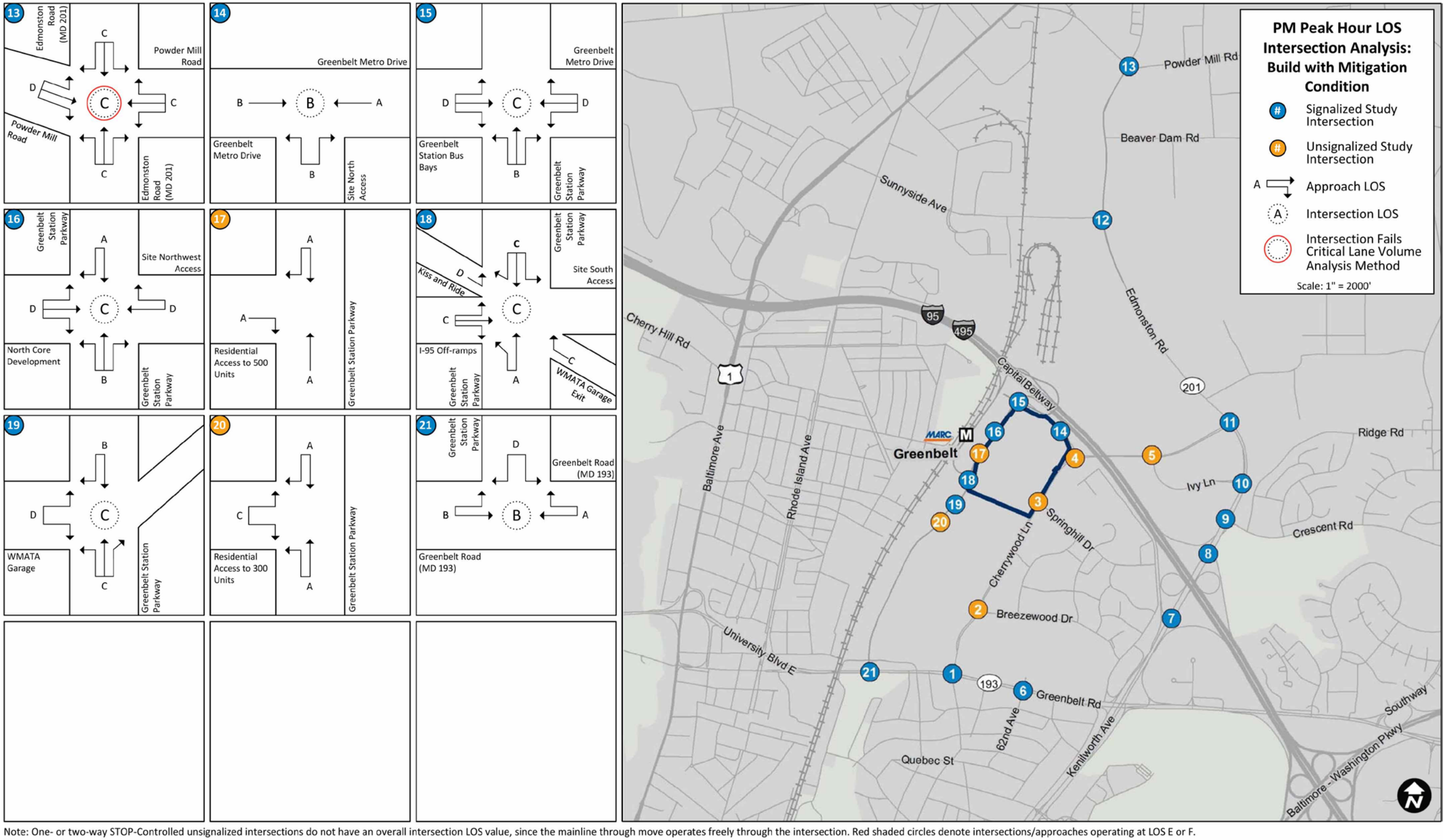
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.

Figure 6-5: Build with Mitigation Condition Intersection LOS for PM Peak Hour



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.

Figure 6-5: Build with Mitigation Condition Intersection LOS for PM Peak Hour (continued)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection. Red shaded circles denote intersections/approaches operating at LOS E or F.
[*] = Unsignalized intersection requires attention due to failing minor approach movements.

Table 6-1: Comparison of No-build and Build with Mitigation Condition Intersection AM and PM Peak Hour Operations Analysis

#	Intersection and Approach	Lane Group	No-build Condition									Build with Mitigation Condition									
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
1	**Greenbelt Road (MD 193) & Cherrywood Lane/60th Avenue (Signalized)**																				
	EB (Greenbelt Rd)	L	63.2	E				53.0	D				59.4	E				44.9	D		
	EB (Greenbelt Rd)	TR	8.8	A				13.9	B				7.5	A				16.5	B		
	EB Overall (Greenbelt Rd)		**19.1**	**B**				**21.2**	**C**				**17.3**	**B**				**21.8**	**C**		
	WB (Greenbelt Rd)	L	64.2	E				67.0	E				64.6	E				56.6	E		
	WB (Greenbelt Rd)	TR	20.6	C				35.7	D				19.8	B				40.7	D		
	WB Overall (Greenbelt Rd)		21.5	C				**36.9**	**D**				**20.7**	**C**				**41.3**	**D**		
	NB (60th Ave)	L	-	-				-	-				71.6	E				78.3	E		
	NB (60th Ave)	LTR/TR	74.0	E				132.4	F				70.3	E				93.9	F		
	NB Overall (60th Ave)		**74.0**	**E**				**132.4**	**F**				**70.8**	**E**				**88.6**	**F**		
	SB (Cherrywood Ln)	L	76.7	E				106.8	F				71.5	E				102.7	F		
	SB (Cherrywood Ln)	LT	76.7	E				108.0	F				71.8	E				102.9	F		
	SB (Cherrywood Ln)	R	70.0	E				83.5	F				69.4	E				77.1	E		
	SB Overall (Cherrywood Ln)		**71.9**	**E**				**91.0**	**F**				**70.0**	**E**				**85.4**	**F**		
	Overall		**28.5**	**C**	**1,315**	**D**	**Pass**	**42.2**	**D**	**1,504**	**E**	**Pass**	**27.1**	**C**	**1,283**	**C**	**Pass**	**42.4**	**D**	**1,501**	**E**	**Pass**
2	**Cherrywood Lane & Breezewood Drive (AWSC)**																				
	WB (Breezewood Dr)	LR	13.3	-				12.5	-				13.4	-				13.0	-		
	WB Overall (Breezewood Dr)		**13.3**	**B**				**12.5**	**B**				**13.4**	**B**				**13.0**	**B**		
	NB (Cherrywood Ln)	T	11.2	-				12.4	-				11.3	-				12.9	-		
	NB (Cherrywood Ln)	R	8.7	-				9.4	-				8.7	-				9.7	-		
	NB Overall (Cherrywood Ln)		**10.1**	**B**				**11.1**	**B**				**10.2**	**B**				**11.5**	**B**		
	SB (Cherrywood Ln)	L	9.7	-				10.5	-				9.7	-				10.6	-		
	SB (Cherrywood Ln)	T	10.8	-				15.1	-				11.0	-				21.9	-		
	SB Overall (Cherrywood Ln)		**10.4**	**B**				**13.7**	**B**				**10.6**	**B**				**19.0**	**C**		
	Overall		**11.2**	**B**	**N/A**	**N/A**	**Pass**	**12.5**	**B**	**N/A**	**N/A**	**Pass**	**11.3**	**B**	**N/A**	**N/A**	**Pass**	**15.2**	**C**	**N/A**	**N/A**	**Pass**
3	**Cherrywood Lane & Springhill Drive (TWSC)**																				
	WB (Springhill Dr)	LR	16.4	C				128.6	F				16.5	C				176.5	F		
	WB Overall (Springhill Dr)		**16.4**	**C**				**128.6**	**F**				**16.5**	**C**				**176.5**	**F**		
	SB (Cherrywood Ln)	L	8.3	A				8.7	A				8.3	A				8.7	A		
	SB Overall (Cherrywood Ln)		**3.0**	**-**				**2.4**	**-**				**3.0**	**-**				**2.1**	**-**		
	Overall		**5.2**	**-**	**N/A**	**N/A**	**Pass**	**27.0**	**-**	**N/A**	**N/A**	**Pass**	**5.2**	**-**	**N/A**	**N/A**	**Pass**	**34.3**	**-**	**N/A**	**N/A**	**Pass**

Table 6-1: Comparison of No-build and Build with Mitigation Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build with Mitigation Condition									
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
4	**Cherrywood Lane & Greenbelt Metro Drive (Roundabout) [a]**																				
	EB (Greenbelt Metro Dr)	LR	6.1	A				14.6	B				6.2	A				16.5	C		
	EB Overall (Greenbelt Metro Dr)		**3.3**	**A**				**7.5**	**A**				**3.3**	**A**				**7.9**	**A**		
	NB (Cherrywood Ln)	LT	11.8	B				14.4	B				11.8	B				15.6	C		
	NB Overall (Cherrywood Ln)		**11.8**	**B**				**14.4**	**B**				**11.8**	**B**				**15.6**	**C**		
	SB (Cherrywood Ln)	T	6.3	A				12.0	B				6.3	A				12.0	B		
	SB Overall (Cherrywood Ln)		**2.2**	**A**				**8.9**	**A**				**2.0**	**A**				**8.9**	**A**		
	Overall		**6.0**	**A**	**N/A**	**N/A**	**Pass**	**9.8**	**A**	**N/A**	**N/A**	**Pass**	**5.8**	**A**	**N/A**	**N/A**	**Pass**	**10.0**	**B**	**N/A**	**N/A**	**Pass**
5	**Cherrywood Lane & Ivy Lane (TWSC)**																				
	EB (Cherrywood Ln)	LTR	3.0	A				0.4	A				3.1	A				0.4	A		
	EB Overall (Cherrywood Ln)		**3.0**	**-**				**0.4**	**-**				**3.1**	**-**				**0.4**	**-**		
	WB (Cherrywood Ln)	L	8.3	A				8.8	A				8.3	A				8.9	A		
	WB (Cherrywood Ln)	TR	0.0	-				0.0	-				0.0	-				0.0	-		
	WB Overall (Cherrywood Ln)		**0.4**	**-**				**0.2**	**-**				**0.4**	**-**				**0.2**	**-**		
	NB (Ivy Ln)	LT	67.2	F				^	F				79.7	F				^	F		
	NB (Ivy Ln)	R	10.3	B				12.1	B				10.3	B				12.5	B		
	NB Overall (Ivy Ln)		**55.7**	**F**				**^**	**F**				**65.7**	**F**				**^**	**F**		
	SB (Ivy Ln)	LTR	41.0	E				402.7	F				44.7	E				443.6	F		
	SB Overall (Ivy Ln)		**41.0**	**E**				**402.7**	**F**				**44.7**	**E**				**443.6**	**F**		
	Overall		**6.0**	**-**	**N/A**	**N/A**	**Pass**	**^**	**-**	**N/A**	**N/A**	**Fail**	**6.6**	**-**	**N/A**	**N/A**	**Pass**	**^**	**-**	**N/A**	**N/A**	**Fail**
6	**Greenbelt Road (MD 193) & 62 Avenue/Beltway Plaza Driveway (Signalized)**																				
	EB (Greenbelt Rd)	L	1.7	A				7.0	A				2.7	A				8.3	A		
	EB (Greenbelt Rd)	TR	2.6	A				11.3	B				3.5	A				22.2	C		
	EB Overall (Greenbelt Rd)		**2.6**	**A**				**11.2**	**B**				**3.5**	**A**				**22.0**	**C**		
	WB (Greenbelt Rd)	L	4.0	A				24.7	C				4.1	A				25.4	C		
	WB (Greenbelt Rd)	T	7.5	A				18.3	B				7.6	A				18.3	B		
	WB (Greenbelt Rd)	R	4.7	A				14.8	B				4.7	A				14.8	B		
	WB Overall (Greenbelt Rd)		**7.2**	**A**				**17.8**	**B**				**7.4**	**A**				**17.8**	**B**		
	NB (62th Ave)	LTR	68.1	E				71.4	E				68.1	E				71.4	E		
	NB Overall (62th Ave)		**68.1**	**E**				**71.4**	**E**				**68.1**	**E**				**71.4**	**E**		
	SB (Beltway Plaza Drwy)	L	68.2	E				69.8	E				68.2	E				69.8	E		
	SB (Beltway Plaza Drwy)	LT	68.3	E				69.5	E				68.3	E				69.5	E		
	SB (Beltway Plaza Drwy)	R	66.7	E				54.9	D				66.7	E				54.9	D		
	SB Overall (Beltway Plaza Drwy)		**67.8**	**E**				**67.1**	**E**				**67.8**	**E**				**67.1**	**E**		
	Overall		**7.5**	**A**	**742**	**A**	**Pass**	**20.4**	**C**	**1,206**	**C**	**Pass**	**7.9**	**A**	**757**	**A**	**Pass**	**25.4**	**C**	**1,220**	**C**	**Pass**

Table 6-1: Comparison of No-build and Build with Mitigation Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build with Mitigation Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
7	**Kenilworth Avenue (MD 201) & I-95/I-495 SB Off-ramp (Signalized)**																				
	EB (I-95/I-495 SB Off-ramp)	L	39.7	D				39.7	D				39.7	D				39.7	D			
	EB (I-95/I-495 SB Off-ramp)	R	6.9	A				0.6	A				7.0	A				0.6	A			
	EB Overall (I-95/I-495 SB Off-ramp)		**13.8**	**B**				**14.9**	**B**				**13.9**	**B**				**14.7**	**B**			
	NB (Kenilworth Ave)	T	4.0	A				4.0	A				4.0	A				4.0	A			
	NB Overall (Kenilworth Ave)		**4.0**	**A**				**4.0**	**A**				**4.0**	**A**				**4.0**	**A**			
	SB (Kenilworth Ave)	T	6.2	A				3.6	A				6.2	A				3.6	A			
	SB Overall (Kenilworth Ave)		**6.2**	**A**				**3.6**	**A**				**6.2**	**A**				**3.6**	**A**			
	Overall		**9.1**	**A**	**730**	**A**	**Pass**	**6.8**	**A**	**593**	**A**	**Pass**	**9.1**	**A**	**730**	**A**	**Pass**	**6.8**	**A**	**594**	**A**	**Pass**
8	**Kenilworth Avenue (MD 201) & I-95/I-495 NB Off-ramp (Signalized)**																				
	WB (I-95/I-495 NB Off-ramp)	L	24.6	C				34.3	C				24.5	C				34.3	C			
	WB (I-95/I-495 NB Off-ramp)	R	26.3	C				31.1	C				26.2	C				31.1	C			
	WB Overall (I-95/I-495 NB Off-ramp)		**25.4**	**C**				**32.8**	**C**				**25.3**	**C**				**32.8**	**C**			
	NB (Kenilworth Ave)	T	11.1	B				5.4	A				11.2	B				5.4	A			
	NB Overall (Kenilworth Ave)		**11.1**	**B**				**5.4**	**A**				**11.2**	**B**				**5.4**	**A**			
	SB (Kenilworth Ave)	T	7.7	A				3.4	A				7.8	A				3.3	A			
	SB Overall (Kenilworth Ave)		**7.7**	**A**				**3.4**	**A**				**7.8**	**A**				**3.3**	**A**			
	Overall		**16.7**	**B**	**868**	**A**	**Pass**	**13.3**	**B**	**779**	**A**	**Pass**	**16.7**	**B**	**868**	**A**	**Pass**	**13.3**	**B**	**781**	**A**	**Pass**
9	**Kenilworth Avenue (MD 201) & Crescent Road/Maryland SHA Office (Signalized)**																				
	EB (Maryland SHA Office)	LTR	26.0	C				36.1	D				26.0	C				36.1	D			
	EB Overall (Maryland SHA Office)		**26.0**	**C**				**36.1**	**D**				**26.0**	**C**				**36.1**	**D**			
	WB (Crescent Rd)	LT	43.2	D				47.8	D				43.2	D				47.8	D			
	WB (Crescent Rd)	R	26.6	C				36.3	D				26.6	C				36.3	D			
	WB Overall (Crescent Rd)		**38.0**	**D**				**43.0**	**D**				**38.0**	**D**				**43.0**	**D**			
	NB (Kenilworth Ave)	L	47.4	D				61.5	E				47.3	D				61.5	E			
	NB (Kenilworth Ave)	T	13.3	B				10.4	B				13.4	B				10.4	B			
	NB (Kenilworth Ave)	R	8.5	A				5.9	A				8.6	A				5.9	A			
	NB Overall (Kenilworth Ave)		**13.9**	**B**				**10.2**	**B**				**14.0**	**B**				**10.2**	**B**			
	SB (Kenilworth Ave)	L	67.1	E				53.3	D				67.0	E				53.8	D			
	SB (Kenilworth Ave)	T	4.7	A				5.8	A				4.7	A				5.8	A			
	SB (Kenilworth Ave)	R	12.0	B				4.9	A				12.0	B				4.9	A			
	SB Overall (Kenilworth Ave)		**9.3**	**A**				**11.1**	**B**				**9.3**	**A**				**11.2**	**B**			
	Overall		**15.1**	**B**	**962**	**A**	**Pass**	**12.9**	**B**	**796**	**A**	**Pass**	**15.1**	**B**	**965**	**A**	**Pass**	**12.9**	**B**	**798**	**A**	**Pass**

Table 6-1: Comparison of No-build and Build with Mitigation Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build with Mitigation Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
10	**Kenilworth Avenue (MD 201) & Ivy Lane (Signalized)**																				
	EB (Ivy Ln)	R	0.1	A				0.7	A				0.1	A				0.8	A		
	EB Overall (Ivy Ln)		**0.1**	**A**				**0.7**	**A**				**0.1**	**A**				**0.8**	**A**		
	NB (Kenilworth Ave)	L	18.6	B				25.8	C				18.6	B				25.8	C		
	NB (Kenilworth Ave)	T	0.3	A				0.2	A				0.3	A				0.2	A		
	NB Overall (Kenilworth Ave)		**3.4**	**A**				**1.7**	**A**				**3.4**	**A**				**1.7**	**A**		
	SB (Kenilworth Ave)	T	0.7	A				1.2	A				0.7	A				1.2	A		
	SB (Kenilworth Ave)	R	0.0	A				0.0	A				0.0	A				0.0	A		
	SB Overall (Kenilworth Ave)		**0.7**	**A**				**1.2**	**A**				**0.7**	**A**				**1.2**	**A**		
	Overall		**2.3**	**A**	**784**	**A**	**Pass**	**1.3**	**A**	**761**	**A**	**Pass**	**2.3**	**A**	**784**	**A**	**Pass**	**1.3**	**A**	**761**	**A**	**Pass**
11	**Kenilworth Avenue/Edmonston Road (MD 201) & Cherrywood Lane (Signalized)**																				
	EB (Cherrywood Ln)	L	46.7	D				39.4	D				46.8	D				39.8	D		
	EB (Cherrywood Ln)	R	40.7	D				33.8	C				40.7	D				33.3	C		
	EB Overall (Cherrywood Ln)		**45.7**	**D**				**37.5**	**D**				**45.8**	**D**				**37.6**	**D**		
	NB (Kenilworth Ave)	L	27.0	C				13.8	B				27.6	C				14.0	B		
	NB (Kenilworth Ave)	T	1.1	A				1.2	A				1.1	A				1.3	A		
	NB Overall (Kenilworth Ave)		**11.1**	**B**				**3.5**	**A**				**11.5**	**B**				**3.6**	**A**		
	SB (Edmonston Rd)	T	22.6	C				13.9	B				23.0	C				14.3	B		
	SB (Edmonston Rd)	R	17.5	B				10.0	B				18.5	B				10.3	B		
	SB Overall (Edmonston Rd)		**21.2**	**C**				**13.2**	**B**				**21.7**	**C**				**13.6**	**B**		
	Overall		**18.8**	**B**	**1,212**	**C**	**Pass**	**14.7**	**B**	**990**	**A**	**Pass**	**19.2**	**B**	**1,221**	**C**	**Pass**	**15.2**	**B**	**1,008**	**B**	**Pass**
12	**Edmonston Road (MD 201) & Sunnyside Avenue (Signalized)**																				
	EB (Sunnyside Ave)	L	108.9	F				113.0	F				36.3	D				57.3	E		
	EB (Sunnyside Ave)	R	66.9	E				62.0	E				23.6	C				32.5	C		
	EB Overall (Sunnyside Ave)		**77.9**	**E**				**80.1**	**F**				**27.0**	**C**				**41.2**	**D**		
	NB (Edmonston Rd)	L	102.8	F				98.0	F				19.1	B				27.8	C		
	NB (Edmonston Rd)	T	4.4	A				18.3	B				3.8	A				8.3	A		
	NB Overall (Edmonston Rd)		**29.6**	**C**				**33.3**	**C**				**7.7**	**A**				**11.9**	**B**		
	SB (Edmonston Rd)	T	41.1	D				48.1	D				16.2	B				24.4	C		
	SB (Edmonston Rd)	R	5.0	A				3.8	A				3.7	A				4.7	A		
	SB Overall (Edmonston Rd)		**35.6**	**D**				**41.4**	**D**				**14.3**	**B**				**21.4**	**C**		
	Overall		**40.1**	**D**	**1,486**	**E**	**Pass**	**46.7**	**D**	**1,692**	**F**	**Fail**	**13.8**	**B**	**1,015**	**B**	**Pass**	**21.7**	**C**	**1,188**	**C**	**Pass**

Table 6-1: Comparison of No-build and Build with Mitigation Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build with Mitigation Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
13	**Edmonston Road (MD 201) & Powder Mill Road (Signalized)**																				
	EB (Powder Mill Rd)	L	47.3	D				45.2	D				31.8	C				27.0	C		
	EB (Powder Mill Rd)	T	62.8	E				81.1	F				38.0	D				47.5	D		
	EB (Powder Mill Rd)	R	48.7	D				44.7	D				38.6	D				29.7	C		
	EB Overall (Powder Mill Rd)		**52.8**	**D**				**60.5**	**E**				**38.0**	**D**				**37.1**	**D**		
	WB (Powder Mill Rd)	L	57.0	E				84.1	F				25.7	C				27.1	C		
	WB (Powder Mill Rd)	T	41.8	D				38.4	D				25.3	C				21.0	C		
	WB (Powder Mill Rd)	R	35.6	D				34.1	C				21.6	C				18.6	B		
	WB Overall (Powder Mill Rd)		**46.9**	**D**				**53.4**	**D**				**25.1**	**C**				**22.8**	**C**		
	NB (Edmonston Rd)	L	48.5	D				76.7	E				18.7	B				29.5	C		
	NB (Edmonston Rd)	T	12.8	B				23.2	C				16.5	B				26.3	C		
	NB (Edmonston Rd)	R	8.4	A				12.5	B				10.5	B				11.2	B		
	NB Overall (Edmonston Rd)		**29.7**	**C**				**41.3**	**D**				**17.2**	**B**				**25.2**	**C**		
	SB (Edmonston Rd)	L	40.5	D				54.5	D				24.3	C				53.0	D		
	SB (Edmonston Rd)	TR	52.5	D				60.4	E				30.0	C				23.5	C		
	SB Overall (Edmonston Rd)		**52.0**	**D**				**59.8**	**E**				**29.8**	**C**				**26.4**	**C**		
	Overall		**42.5**	**D**	**1,593**	**E**	**Pass**	**50.9**	**D**	**1,867**	**F**	**Fail**	**26.3**	**C**	**1,348**	**D**	**Pass**	**28.3**	**C**	**1,643**	**F**	**Fail**
14	**Greenbelt Metro Drive & Site North Access (Signalized)** [b]																				
	EB (Greenbelt Metro Dr)	T	N/A	N/A				N/A	N/A				3.3	A				11.0	B		
	EB Overall (Greenbelt Metro Dr)		**N/A**	**N/A**				**N/A**	**N/A**				**3.3**	**A**				**11.0**	**B**		
	WB (Greenbelt Metro Dr)	L	N/A	N/A				N/A	N/A				-	-				-	-		
	WB (Greenbelt Metro Dr)	T	N/A	N/A				N/A	N/A				4.3	A				7.5	A		
	WB Overall (Greenbelt Metro Dr)		**N/A**	**N/A**				**N/A**	**N/A**				**4.3**	**A**				**7.5**	**A**		
	NB (Site North Access)	L	N/A	N/A				N/A	N/A				21.8	C				19.6	B		
	NB (Site North Access)	R	N/A	N/A				N/A	N/A				21.3	C				16.8	B		
	NB Overall (Site North Access)		**N/A**	**N/A**				**N/A**	**N/A**				**21.7**	**C**				**19.0**	**B**		
	Overall		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**4.7**	**A**	**605**	**A**	**Pass**	**12.9**	**B**	**1,029**	**B**	**Pass**

Table 6-1: Comparison of No-build and Build with Mitigation Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build with Mitigation Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
15	**Greenbelt Station Bus Bays/Greenbelt Metro Drive & Greenbelt Station Parkway (Signalized)**																				
	EB (Greenbelt Sta Bus Bays)	LT	75.7	E				54.0	D				76.9	E				54.0	D		
	EB (Greenbelt Sta Bus Bays)	R	-	-				-	-				-	-				-	-		
	EB Overall (Greenbelt Sta Bus Bays)		**75.7**	**E**				**54.0**	**D**				**76.9**	**E**				**54.0**	**D**		
	WB (Greenbelt Metro Dr)	L	56.6	E				45.2	D				36.2	D				39.4	D		
	WB (Greenbelt Metro Dr)	T	35.7	D				31.7	C				21.3	C				29.9	C		
	WB (Greenbelt Metro Dr)	R	36.0	D				31.5	C				21.7	C				36.8	D		
	WB Overall (Greenbelt Metro Dr)		**52.1**	**D**				**41.6**	**D**				**32.6**	**C**				**37.4**	**D**		
	NB (Greenbelt Sta Pkwy)	L	-	-				-	-				-	-				-	-		
	NB (Greenbelt Sta Pkwy)	T	14.3	B				8.4	A				17.5	B				8.4	A		
	NB (Greenbelt Sta Pkwy)	R	13.8	B				21.4	C				22.5	C				13.0	B		
	NB Overall (Greenbelt Sta Pkwy)		**14.0**	**B**				**16.2**	**B**				**19.8**	**B**				**11.3**	**B**		
	Overall		**31.4**	**C**	**644**	**A**	**Pass**	**23.3**	**C**	**603**	**A**	**Pass**	**26.6**	**C**	**682**	**A**	**Pass**	**22.4**	**C**	**813**	**A**	**Pass**
16	**Greenbelt Station Parkway & North Core Development/Site Northwest Access (Signalized)**																				
	EB (North Core Dev)	L	69.2	E				42.1	D				45.9	D				42.2	D		
	EB (North Core Dev)	TR	66.5	E				35.0	C				43.2	D				35.1	D		
	EB Overall (North Core Dev)		**68.8**	**E**				**40.7**	**D**				**45.5**	**D**				**40.8**	**D**		
	WB (Site Northwest Access)	LTR (AM)	-	-				-	-				47.0	D				-	-		
	WB (Site Northwest Access)	TR (PM)	-	-				-	-				-	-				48.2	D		
	WB (Site Northwest Access)	R (PM)	-	-				-	-				-	-				50.6	D		
	WB Overall (Site Northwest Access)		**-**	**-**				**-**	**-**				**47.0**	**D**				**49.4**	**D**		
	NB (Greenbelt Sta Pkwy)	L	3.9	A				3.6	A				4.6	A				11.9	B		
	NB (Greenbelt Sta Pkwy)	TR	2.2	A				3.4	A				2.6	A				11.0	B		
	NB Overall (Greenbelt Sta Pkwy)		**2.7**	**A**				**3.4**	**A**				**2.9**	**A**				**11.1**	**B**		
	SB (Greenbelt Sta Pkwy)	TR	0.1	A				0.1	A				0.2	A				7.8	A		
	SB Overall (Greenbelt Sta Pkwy)		**0.1**	**A**				**0.1**	**A**				**0.2**	**A**				**7.8**	**A**		
	Overall		**5.4**	**A**	**600**	**A**	**Pass**	**11.0**	**B**	**460**	**A**	**Pass**	**4.7**	**A**	**976**	**A**	**Pass**	**22.5**	**C**	**952**	**A**	**Pass**
17	**Greenbelt Station Parkway & Residential Access to 500 Units (TWSC)**																				
	EB (Residential Access)	R	9.8	A				9.3	A				10.0	A				9.3	A		
	EB Overall (Residential Access)		**9.8**	**A**				**9.3**	**A**				**10.0**	**A**				**9.3**	**A**		
	Overall		**0.6**	**-**	**N/A**	**N/A**	**Pass**	**0.2**	**-**	**N/A**	**N/A**	**Pass**	**0.5**	**-**	**N/A**	**N/A**	**Pass**	**0.2**	**-**	**N/A**	**N/A**	**Pass**

Table 6-1: Comparison of No-build and Build with Mitigation Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build with Mitigation Condition									
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour				
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
18	**Greenbelt Station Parkway & I-95/I-495 Off-ramps/Site South Access/Kiss & Ride (Signalized)**																				
	EB (I-95 Off-ramps)	L	71.7	E				44.8	D			49.2	D				38.7	D			
	EB (I-95 Off-ramps)	LTR	56.3	E				31.2	C			35.8	D				29.2	C			
	EB Overall (I-95 Off-Ramps)		**61.7**	**E**				**36.1**	**D**			**40.2**	**D**				**32.6**	**C**			
	EB (Kiss and Ride)	L	55.9	E				37.5	D			55.6	E				43.8	D			
	EB Overall (Kiss and Ride)		**55.9**	**E**				**37.5**	**D**			**55.6**	**E**				**43.8**	**D**			
	WB (Site South Access)	R	37.0	D				35.7	D			22.9	C				20.6	C			
	WB Overall (Site South Access)		**37.0**	**D**				**35.7**	**D**			**22.9**	**C**				**20.6**	**C**			
	NB (Greenbelt Sta Pkwy)	L	81.8	F				33.4	C			13.4	B				8.2	A			
	NB (Greenbelt Sta Pkwy)	T	30.9	C				23.5	C			20.8	C				9.2	A			
	NB Overall (Greenbelt Sta Pkwy)		**32.7**	**C**				**24.3**	**C**			**20.6**	**C**				**9.2**	**A**			
	SB (Greenbelt Sta Pkwy)	L	2.9	A				84.5	F			53.4	D				1.0	A			
	SB (Greenbelt Sta Pkwy)	TR	6.6	A				76.4	E			14.1	B				36.4	D			
	SB Overall (Greenbelt Sta Pkwy)		**5.7**	**A**				**77.7**	**E**			**26.2**	**C**				**30.9**	**C**			
	Overall		**40.0**	**D**	**950**	**A**	**Pass**	**36.9**	**D**	**1,103**	**B**	**Pass**	**34.8**	**C**	**1,420**	**D**	**Pass**	**24.7**	**C**	**1,056**	**B**	**Pass**
19	**Greenbelt Station Parkway & WMATA Garage (Signalized)**																				
	EB (WMATA Garage)	L	76.3	E				51.0	D			64.6	E				51.0	D			
	EB (WMATA Garage)	R	72.4	E				37.8	D			49.1	D				37.8	D			
	EB Overall (WMATA Garage)		**74.9**	**E**				**49.3**	**D**			**59.0**	**E**				**49.3**	**D**			
	NB (Greenbelt Sta Pkwy)	LT	65.7	E				51.5	D			41.4	D				50.4	D			
	NB (Greenbelt Sta Pkwy)	TR	3.0	A				4.6	A			2.0	A				4.6	A			
	NB Overall (Greenbelt Sta Pkwy)		**34.7**	**C**				**28.3**	**C**			**21.7**	**C**				**27.7**	**C**			
	SB (Greenbelt Sta Pkwy)	T	18.8	B				20.5	C			17.4	B				19.3	B			
	SB (Greenbelt Sta Pkwy)	R	38.5	D				12.9	B			24.1	C				13.0	B			
	SB Overall (Greenbelt Sta Pkwy)		**25.5**	**C**				**20.3**	**C**			**19.7**	**B**				**19.2**	**B**			
	Overall		**31.4**	**C**	**429**	**A**	**Pass**	**27.8**	**C**	**524**	**A**	**Pass**	**21.3**	**C**	**480**	**A**	**Pass**	**27.1**	**C**	**524**	**A**	**Pass**

Table 6-1: Comparison of No-build and Build with Mitigation Condition Intersection AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	No-build Condition									Build with Mitigation Condition								
			AM Peak Hour					PM Peak Hour				AM Peak Hour					PM Peak Hour			
			HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check	HCM 2000		CLV		Check
			Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS		Delay (sec/ veh)	LOS	Critical Lane Vol	LOS	
20	**Greenbelt Station Parkway & Residential Access to 300 Units (TWSC)**																				
	EB (Residential Access)	LR	21.1	C				20.8	C				24.4	C				20.9	C		
	EB Overall (Residential Access)		**21.1**	**C**				**20.8**	**C**				**24.4**	**C**				**20.9**	**C**		
	NB (Greenbelt Sta Pkwy)	LT	0.2	A				0.8	A				0.2	A				0.7	A		
	NB Overall (Greenbelt Sta Pkwy)		**0.1**	**-**				**0.3**	**-**				**0.1**	**-**				**0.3**	**-**		
	Overall		**1.5**	**-**	**N/A**	**N/A**	**Pass**	**0.6**	**-**	**N/A**	**N/A**	**Pass**	**1.6**	**-**	**N/A**	**N/A**	**Pass**	**0.6**	**-**	**N/A**	**N/A**	**Pass**
21	**Greenbelt Road (MD 193) & Greenbelt Station Parkway (Signalized)**																				
	EB (Greenbelt Rd)	L	63.6	E				70.0	E				67.5	E				70.0	E		
	EB (Greenbelt Rd)	T	3.2	A				8.0	A				3.3	A				8.0	A		
	EB Overall (Greenbelt Rd)		**11.5**	**B**				**12.6**	**B**				**14.0**	**B**				**12.7**	**B**		
	WB (Greenbelt Rd)	T	3.6	A				4.9	A				4.7	A				6.5	A		
	WB (Greenbelt Rd)	R	0.1	A				1.8	A				0.7	A				1.7	A		
	WB Overall (Greenbelt Rd)		**3.2**	**A**				**4.5**	**A**				**4.3**	**A**				**5.8**	**A**		
	SB (Greenbelt Sta Pkwy)	L	67.1	E				59.9	E				68.2	E				59.8	E		
	SB (Greenbelt Sta Pkwy)	R	46.0	D				47.4	D				48.3	D				47.3	D		
	SB Overall (Greenbelt Sta Pkwy)		**57.5**	**E**				**54.1**	**D**				**59.2**	**E**				**54.0**	**D**		
	Overall		**11.1**	**B**	**988**	**A**	**Pass**	**12.7**	**B**	**1,100**	**B**	**Pass**	**12.6**	**B**	**1,020**	**B**	**Pass**	**13.2**	**B**	**1,101**	**B**	**Pass**

Notes:

AWSC = All-way STOP-Controlled intersection

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left / through / right lanes

LTR/LTR = No-build/Build with Mitigation

LOS = Level of Service

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

Delay is Measured in Seconds Per Vehicle.

Red cells denote intersections or approaches operating at unacceptable conditions.

^ Highway Capacity Manual was unable to report accurate delay using default gap acceptance values.

[a] Highway Capacity Software 2010 Roundabout results

[b] Signalized intersection would be part of the Build with Mitigation Condition, but was included as part of the No-build Condition provided by Renard Development Company, LLC.

6.6.5 Queuing Analysis

Synchro™ was used to calculate the 50th percentile queue lengths, and SimTraffic™ was used to calculate the 95th percentile queue lengths. The SimTraffic simulations have a statistical error of plus or minus 3.1 percent for the AM peak hour and 5.0 percent for the PM peak hour simulations. Based on the Synchro™ and SimTraffic™ analysis, there would be no signalized intersection approaches that would experience failing queue lengths in excess of 150 feet of the No-build Condition length.

6.6.5.1 Unsignalized Queuing Analysis

Based on the Synchro™ and SimTraffic™ analysis, there would be no unsignalized intersection approaches that would experience failing queue lengths in excess of 150 feet of the No-build Condition length.

6.6.5.2 Complete Intersection Queuing Analysis

The results of the No-build Condition compared with the Build with Mitigation Condition queuing analysis for both signalized and unsignalized intersections are presented in table 6-2. Note that the percentile values are expressed in feet, and a car occupies about 25 linear feet of roadway, including the space between cars.

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Table 6-2: Comparison of No-build and Build with Mitigation Condition Queuing Analysis

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build with Mitigation			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
1	**Greenbelt Road (MD 193) & Cherrywood Lane/60th Avenue (Signalized)**										
	EB (Greenbelt Rd)	L	350	132	165	240	250	130	164	221	255
	EB (Greenbelt Rd)	TR	1,584	148	128	373	294	134	126	427	379
	WB (Greenbelt Rd)	L	200	43	126	68	137	43	129	57	172
	WB (Greenbelt Rd)	TR	1,334	598	324	208	296	601	327	251	405
	NB (60th Ave)	L	318	-	-	-	-	55	102	54	101
	NB (60th Ave)	LTR/TR	318	132	217	154	#357	71	135	92	229
	SB (Cherrywood Ln)	L	350	74	112	172	254	75	107	194	271
	SB (Cherrywood Ln)	LT	1,300	75	134	178	315	76	132	198	399
	SB (Cherrywood Ln)	R	1,300	252	259	653	529	292	238	674	697
2	**Cherrywood Lane & Breezewood Drive (AWSC)**										
	WB (Breezewood Dr)	LR	573	-	86	-	76	-	82	-	77
	NB (Cherrywood Ln)	T	1,300	-	120	-	162	-	131	-	150
	NB (Cherrywood Ln)	R	1,300	-	81	-	113	-	84	-	107
	SB (Cherrywood Ln)	L	175	-	57	-	65	-	54	-	65
	SB (Cherrywood Ln)	T	2,394	-	73	-	85	-	72	-	98
3	**Cherrywood Lane & Springhill Drive (TWSC)**										
	WB (Springhill Dr)	LR	620	-	90	-	189	-	84	-	207
	NB (Cherrywood Ln)	TR	2,394	-	-	-	3	-	-	-	3
	SB (Cherrywood Ln)	L	350	-	53	-	68	-	52	-	67
4	**Cherrywood Lane & Greenbelt Metro Drive (Roundabout)**										
	EB (Greenbelt Metro Dr)	L	449	-	59	-	109	-	59	-	187
	EB (Greenbelt Metro Dr)	R	250	-	25	-	43	0	20	-	89
	NB (Cherrywood Ln)	LT	1,081	-	92	-	107	-	104	-	128
	SB (Cherrywood Ln)	T	1,451	-	42	-	83	0	41	-	80
	SB (Cherrywood Ln)	R	200	-	13	-	10	-	20	-	7
5	**Cherrywood Lane & Ivy Lane (TWSC)**										
	EB (Cherrywood Ln)	LTR	1,451	-	156	-	45	-	159	-	50
	WB (Cherrywood Ln)	L	219	-	35	-	23	-	35	-	24
	WB (Cherrywood Ln)	TR	219	-	12	-	9	-	13	-	6
	NB (Ivy Ln)	LT	485	-	81	-	131	-	82	-	146
	NB (Ivy Ln)	R	485	-	38	-	53	-	37	-	54
	SB (Ivy Ln)	LTR	223	-	66	-	#287	-	69	-	#279

Table 6-2: Comparison of No-build and Build with Mitigation Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build with Mitigation			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
6	**Greenbelt Road (MD 193) & 62 Avenue/Beltway Plaza Driveway (Signalized)**										
	EB (Greenbelt Rd)	L	250	0	27	9	63	1	25	12	96
	EB (Greenbelt Rd)	TR	1,334	63	56	511	221	64	57	676	398
	WB (Greenbelt Rd)	L	250	9	53	19	123	9	55	19	104
	WB (Greenbelt Rd)	T	1,038	190	168	373	291	197	176	375	286
	WB (Greenbelt Rd)	R	1,038	0	39	3	96	0	34	3	99
	NB (62th Ave)	LTR	697	25	96	115	202	25	100	115	194
	SB (Beltway Plaza Drwy)	L	350	16	14	173	238	16	10	173	243
	SB (Beltway Plaza Drwy)	LT	472	17	69	172	268	17	67	172	277
	SB (Beltway Plaza Drwy)	R	350	0	23	0	51	0	22	0	73
7	**Kenilworth Avenue (MD 201) & I-95/I-495 SB Off-ramp (Signalized)**										
	EB (I-95/I-495 SB Off-ramp)	L	531	112	300	97	211	112	288	97	202
	EB (I-95/I-495 SB Off-ramp)	R	736	0	394	0	2	0	316	0	-
	NB (Kenilworth Ave)	T	1,263	46	90	66	116	47	91	66	118
	SB (Kenilworth Ave)	T	574	229	180	56	115	229	171	57	119
8	**Kenilworth Avenue (MD 201) & I-95/I-495 NB Off-ramp (Signalized)**										
	WB (I-95/I-495 NB Off-ramp)	L	885	223	245	160	222	223	246	160	226
	WB (I-95/I-495 NB Off-ramp)	R	835	217	152	61	96	217	153	61	88
	NB (Kenilworth Ave)	T	345	116	131	49	94	119	140	49	96
	SB (Kenilworth Ave)	T	199	56	154	77	129	56	154	78	134
9	**Kenilworth Avenue (MD 201) & Crescent Road/Maryland SHA Office (Signalized)**										
	EB (Maryland SHA Office)	LTR	250	1	36	3	48	1	39	3	47
	WB (Crescent Rd)	LT	441	168	254	79	145	168	245	79	139
	WB (Crescent Rd)	R	250	0	133	0	71	0	129	0	69
	NB (Kenilworth Ave)	L	250	28	85	9	36	28	86	9	36
	NB (Kenilworth Ave)	T	286	234	281	117	160	234	282	117	163
	NB (Kenilworth Ave)	R	250	9	114	2	35	9	119	2	41
	SB (Kenilworth Ave)	L	300	64	110	128	201	64	111	131	205
	SB (Kenilworth Ave)	T	793	45	156	60	446	45	160	60	524
	SB (Kenilworth Ave)	R	793	0	10	0	194	0	10	0	224
10	**Kenilworth Avenue (MD 201) & Ivy Lane (Signalized)**										
	EB (Ivy Ln)	R	-	0	-	0	-	0	-	0	-
	NB (Kenilworth Ave)	L	547	88	134	21	59	87	139	21	58
	NB (Kenilworth Ave)	T	-	45	64	29	-	45	73	29	-
	SB (Kenilworth Ave)	T	1,198	4	93	15	101	4	85	16	102
	SB (Kenilworth Ave)	R	-	0	-	0	-	0	-	0	-

Table 6-2: Comparison of No-build and Build with Mitigation Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build with Mitigation			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
11	**Kenilworth Avenue/Edmonston Road (MD 201) & Cherrywood Lane (Signalized)**										
	EB (Cherrywood Ln)	L	777	68	120	129	165	69	125	139	176
	EB (Cherrywood Ln)	R	1,304	0	65	0	200	0	61	0	198
	NB (Kenilworth Ave)	L	750	81	367	18	148	81	374	15	146
	NB (Kenilworth Ave)	T	1,198	2	59	6	76	2	56	6	79
	SB (Edmonston Rd)	T	594	307	301	212	204	311	281	217	192
	SB (Edmonston Rd)	R	250	31	#265	0	89	46	248	0	78
12	**Edmonston Road (MD 201) & Sunnyside Avenue (Signalized)**										
	EB (Sunnyside Ave)	L	953	182	555	320	#1234	71	127	231	658
	EB (Sunnyside Ave)	R	350	332	#421	455	#425	151	238	290	#434
	NB (Edmonston Rd)	L	450	362	387	268	#602	71	180	73	251
	NB (Edmonston Rd)	T	964	249	259	809	#1865	70	110	222	199
	SB (Edmonston Rd)	T	1,076	1336	#1629	1058	#1726	242	233	336	360
	SB (Edmonston Rd)	R	250	23	#293	14	#336	0	103	0	243
13	**Edmonston Road (MD 201) & Powder Mill Road (Signalized)**										
	EB (Powder Mill Rd)	L	250	43	124	414	237	28	70	50	202
	EB (Powder Mill Rd)	T	639	244	269	0	457	158	230	261	386
	EB (Powder Mill Rd)	R	500	0	83	0	154	67	110	72	101
	WB (Powder Mill Rd)	L	250	114	156	74	119	69	141	43	102
	WB (Powder Mill Rd)	T	693	176	214	129	163	106	193	76	145
	WB (Powder Mill Rd)	R	100	0	100	0	62	0	90	0	43
	NB (Edmonston Rd)	L	541	513	364	~615	324	114	172	123	205
	NB (Edmonston Rd)	T	641	274	246	19	297	246	274	445	458
	NB (Edmonston Rd)	R	325	0	20	64	96	0	35	0	271
	SB (Edmonston Rd)	L	275	21	104	0	140	12	63	39	107
	SB (Edmonston Rd)	TR	806	324	301	0	310	192	250	174	225
14	**Greenbelt Metro Drive & Site North Access (Signalized)** [a]										
	EB (Greenbelt Metro Dr)	T	368	N/A	N/A	N/A	N/A	39	87	137	283
	WB (Greenbelt Metro Dr)	L	-	N/A	N/A	N/A	N/A	-	-	-	-
	WB (Greenbelt Metro Dr)	T	237	N/A	N/A	N/A	N/A	78	131	61	138
	NB (Site North Access)	L	232	-	-	-	-	5	36	62	157
	NB (Site North Access)	R	232	N/A	N/A	N/A	N/A	0	33	0	107

Table 6-2: Comparison of No-build and Build with Mitigation Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build with Mitigation			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
15	**Greenbelt Station Bus Bays/Greenbelt Metro Drive & Greenbelt Station Parkway (Signalized)**										
	EB (Greenbelt Sta Bus Bays	LT	216	22	59	16	54	14	51	16	60
	EB (Greenbelt Sta Bus Bays	R	-	-	-	-	-	-	-	-	-
	WB (Greenbelt Metro Dr)	L	366	412	#446	169	250	278	362	163	250
	WB (Greenbelt Metro Dr)	T	366	14	45	15	57	9	38	14	54
	WB (Greenbelt Metro Dr)	R	275	0	-	0	-	0	-	73	119
	NB (Greenbelt Sta Pkwy)	L	250	-	-	0	4	-	-	0	4
	NB (Greenbelt Sta Pkwy)	T	243	100	102	50	84	69	-	61	88
	NB (Greenbelt Sta Pkwy)	R	243	31	-	12	11	22	112	22	31
16	**Greenbelt Station Parkway & North Core Development/Site Northwest Access (Signalized)**										
	EB (North Core Dev)	L	179	38	80	121	164	24	67	122	160
	EB (North Core Dev)	TR	179	0	36	0	63	0	35	0	114
	WB (Site Northwest Access)	LTR (AM)	-	-	-	-	-	0	48	-	-
	WB (Site Northwest Access)	TR (PM)	-	-	-	-	-	-	-	-	218
	WB (Site Northwest Access)	R (PM)	-	-	-	-	-	-	-	86	202
	NB (Greenbelt Sta Pkwy)	L	505	28	197	33	131	48	149	63	200
	NB (Greenbelt Sta Pkwy)	TR	505	28	107	67	228	65	143	136	305
	SB (Greenbelt Sta Pkwy)	TR	266	0	22	0	13	0	17	0	83
17	**Greenbelt Station Parkway & Residential Access to 500 Units (TWSC)**										
	EB (Residential Access)	R	174	-	59	-	49	-	78	-	49
	SB (Greenbelt Sta Pkwy)	T	-	-	-	-	-	-	5	-	-
	NB (Greenbelt Sta Pkwy)	T	459	-	3	-	302	-	-	-	65
18	**Greenbelt Station Parkway & I-95/I-495 Off-ramps/Site South Access/Kiss & Ride (Signalized)**										
	EB (I-95 Off-ramps)	L	188	238	223	187	134	360	422	195	149
	EB (I-95 Off-ramps)	LTR	188	129	222	21	153	321	470	30	132
	EB (Kiss and Ride)	L	160	229	#258	116	174	85	#217	62	110
	WB (Site South Access)	R	402	6	27	118	160	4	25	90	154
	NB (Greenbelt Sta Pkwy)	L	375	24	59	35	76	10	47	7	56
	NB (Greenbelt Sta Pkwy)	T	530	325	86	110	87	220	88	58	93
	SB (Greenbelt Sta Pkwy)	L	400	0	120	0	54	~120	345	0	38
	SB (Greenbelt Sta Pkwy)	TR	459	0	73	28	93	0	192	15	69

Table 6-2: Comparison of No-build and Build with Mitigation Condition Queuing Analysis (continued)

#	Intersection and Approach	Lane Group	Turning Bay/Link Length (feet)	No-build Condition				Build with Mitigation			
				AM Peak		PM Peak		AM Peak		PM Peak	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
19	**Greenbelt Station Parkway & WMATA Garage (Signalized)**										
	EB (WMATA Garage)	L	150	7	30	100	#158	4	28	100	#162
	EB (WMATA Garage)	R	290	0	24	0	63	0	22	0	83
	NB (Greenbelt Sta Pkwy)	LT	330	358	183	157	80	237	142	158	87
	NB (Greenbelt Sta Pkwy)	TR	330	4	145	48	99	0	109	48	90
	SB (Greenbelt Sta Pkwy)	T	162	141	68	248	152	112	55	220	#177
	SB (Greenbelt Sta Pkwy)	R	162	23	14	0	2	15	13	0	2
20	**Greenbelt Station Parkway & Residential Access to 300 Units (TWSC)**										
	EB (Residential Access)	LR	224	-	64	-	44	-	60	-	45
	NB (Greenbelt Sta Pkwy)	LT	345	-	0	-	0	-	0	-	0
	SB (Greenbelt Sta Pkwy)	TR	350	-	5	-	6	-	2	-	8
21	**Greenbelt Road (MD 193) & Greenbelt Station Parkway (Signalized)**										
	EB (Greenbelt Rd)	L	57	95	144	97	#142	124	169	98	#151
	EB (Greenbelt Rd)	T	1,008	84	95	360	233	84	106	360	242
	WB (Greenbelt Rd)	T	1,584	117	130	165	199	114	121	200	196
	WB (Greenbelt Rd)	R	150	0	71	19	#167	11	52	18	#178
	SB (Greenbelt Sta Pkwy)	L	524	115	162	125	185	109	143	125	198
	SB (Greenbelt Sta Pkwy)	R	225	165	209	184	#242	145	204	185	#238

Notes:

~ 50th percentile volume exceeds capacity, queue is theoretically infinite.

95th percentile volume exceeds capacity, queue may be longer.

m Volume for 95th percentile queue is metered by upstream signal. Due to upstream metering, the 95th percentile queue may be less than the 50th percentile queue.

AWSC = All-way STOP-Controlled intersection

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left / through / right lanes

TWSC = Two-way STOP-Controlled intersection

Red cells denote approaches and lane groups whose queuing length exceeds capacity.

[a] Signalized intersection would be part of the Build with Mitigation Condition, but was included as part of the No-build Condition provided by Renard Development Company, LLC.

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6.6.6 Recommend Traffic Mitigation

Recommended traffic mitigation measures were developed to address the substantial traffic impacts caused by the addition of the Consolidated FBI HQ in Greenbelt. These included traffic signal optimization, road widening, lane geometry improvements at intersections, installation of new traffic signals, lane striping adjustments. If implemented, the recommended traffic mitigation measures would maintain acceptable traffic flow conditions based on the Greenbelt Site Transportation Agreement. The following recommendations in table 6-3 are provided to mitigate the proposed traffic impacts of the Greenbelt Build Condition:

Table 6-3: Recommended Traffic Mitigation

Impact	Mitigation
To improve traffic operations along Greenbelt Station Parkway and Greenbelt Road the traffic signals would be optimized and/or coordinated	Optimize the traffic signals at the following locations: o Greenbelt Road (MD 193) and Greenbelt Station Parkway intersection o Greenbelt Station Parkway and WMATA Garage intersection o Greenbelt Station Parkway and North Core Mixed Use/Site Northwest Access intersection o Greenbelt Station Parkway and Greenbelt Metro Drive intersection
To improve traffic operations along the Edmonston Road corridor widen the road, change the intersection geometry including new turn lanes (optimize traffic signal if warranted)	Widen the road along Edmonston Road between Powder Mill Road and 1,500 feet south of Sunnyside Road and change the lane geometry at the following locations: o Edmonston Road (MD 201) and Powder Mill Road intersection o Edmonston Road (MD 201) and Sunnyside Road intersection
To improve traffic operations at isolated locations change the intersection geometry and optimize traffic signal if warranted	Change the intersection geometry at the following locations: o Greenbelt Road (MD 193) and Cherrywood Lane/60th Avenue intersection o Greenbelt Station Parkway and I-95/I-495 off-ramp/Site South Access intersection
To improve traffic operations at isolated locations install new traffic signals	Install a new traffic signal at Greenbelt Metro Drive and Site North Access intersection
To improve traffic operations along ramp connecting the Interstate to the planned WMATA garage and Greenbelt Station Parkway	Revise the lane striping plane along I-95/I-495 off-ramp from the Interstates to Greenbelt Station Parkway to provide one lane that leads directly to the WMATA garage

The mitigation measures were developed to ensure the intersections would operate in a safe manner for all modes. This included assigning adequate pedestrian crossing times for any signalized intersection that required a change in the number of approach lanes and recommending non-motorized bridges to ensure bicycle and pedestrians can safely cross when an at grade crossing would not be safely accommodated. It is assumed that all planned roadway improvements and mitigation would follow the American Association of State Highway

Transportation Officials, Maryland SHA, M-NCPPC, and Prince George's County requirements to ensure all vehicle, bicycle, and pedestrian movements are designed to the latest safety standards.

Overall, the study area would experience isolated intersection improvements, specifically along Edmonston Road. These improvements would result in changing the impacts from direct, long-term, adverse impacts to direct, long-term, beneficial impacts because the operations would improve to a better operation than the No-build Condition. In addition to these impacts, there would be two failing Interstate facilities: one would be caused by the volume of vehicles added to the I-95/I-495 northbound off-ramp to Landover Road during the AM peak hour, and the second would be caused by the volume of vehicles added to the I-95/I-495 southbound on-ramp from Arena Drive during the PM peak hour. These area-wide impacts would result in direct, long-term, major adverse impacts due to the regional nature of the Interstate system (see Section 6.6.7.3 for further information).

The construction impacts would change from direct, short-term, adverse impacts under the Build Condition to direct, short-term, major adverse impacts under the Build with Mitigation Condition during the construction period. This change in impact level reflects the short-term impacts from adding construction-related trips caused by trucks, employees, and equipment as well as intermittent lane or road closures at the Greenbelt site and locations where the roadway improvements would occur.

6.6.7 Freeway Analysis Summary

The *Highway Capacity Software* (HCS) Version 6.65 was used to determine the Interstate operations for these key on- and off-ramps. The HCS modules follow the HCM uninterrupted flow procedures called freeways. The Interstate system is a network of signed roadways that crisscross the country from coast to coast (east-west) and border to border (north-south) and operate as freeways or uninterrupted vehicle flow. Interrupted vehicle flow refers to the roadways with traffic signals, stop signs, and roundabouts. Based on the proposed FBI trip distribution, 86 percent of forecasted FBI vehicle trips would use the Interstate system (I-95/I-495) to access the proposed site. Because the interstate system is vital to serving the Greenbelt site, the Interstates were evaluated to determine whether or not the added vehicle trips would cause any failing interstate facilities.

Based on the agreed Greenbelt Site Transportation Agreement (Appendix C1), the evaluated Interstate facilities focused on the peak direction only and at the primary off-ramps serving the inbound forecasted FBI vehicle trips during the AM peak hour and the on-ramps serving the outbound forecasted FBI vehicle trips during the PM peak hour.

6.6.7.1 Freeway Facilities Types Studied

Several freeway facility types were evaluated, including merge and weave designs. In total, the analysis included the evaluation of one merge and four weave facilities. Merge facilities represent an on-ramp to the freeway. Weave facilities represent an on-ramp followed by an off-ramp that share the same lane and are spaced close enough to create a crisscross vehicle pattern caused by vehicles entering the freeway, potentially blocking vehicles exiting the freeway or vice versa. The vehicle volumes combined with the distance between the on- and off-ramps help determine whether or not a facility qualifies as a weave or two separate merge and diverge areas (HCM, Equation 12-4; TRB 2010). Figure 6-6 illustrates a typical merge facility, and figure 6-7 illustrates a typical weave facility.

Figure 6-6: Typical Merge Facility

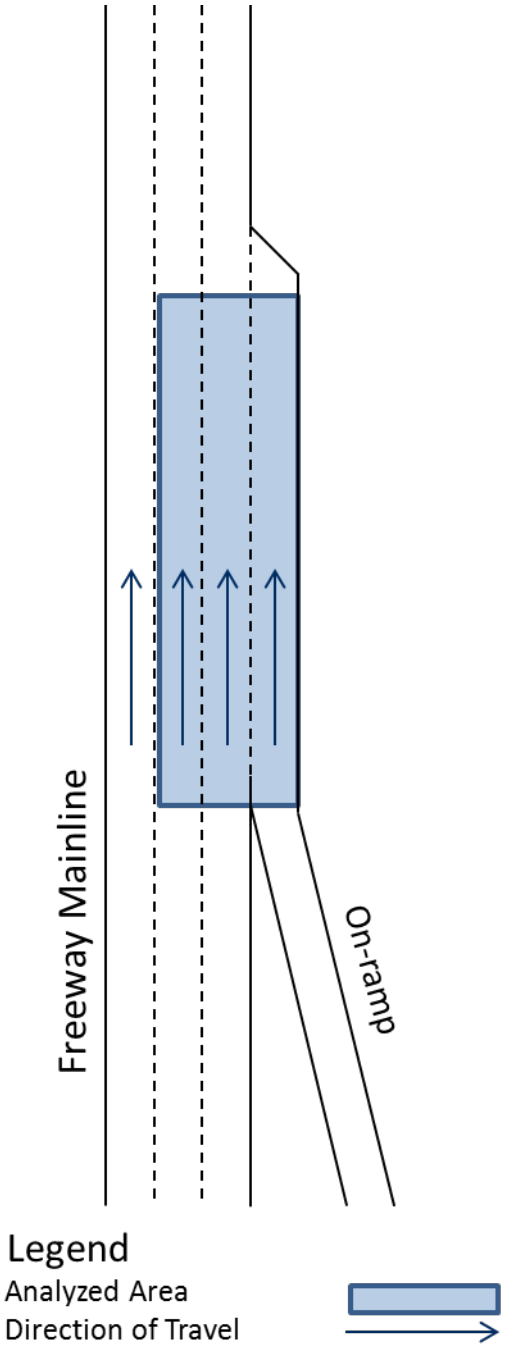
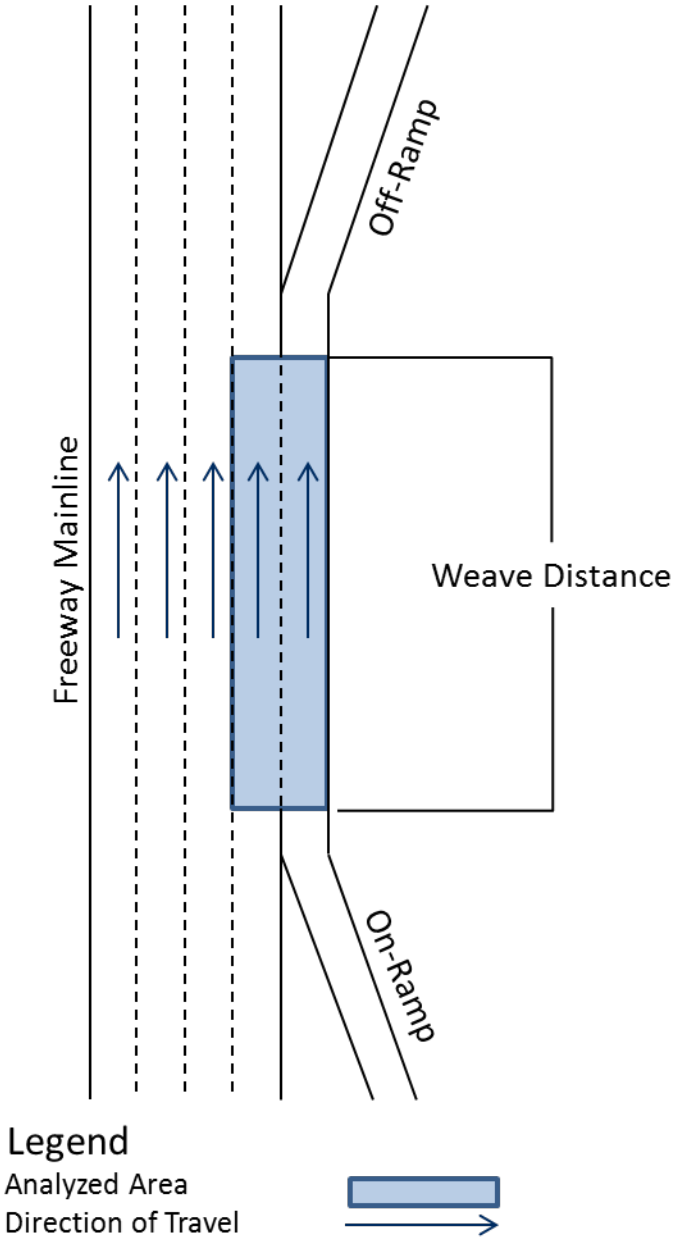


Figure 6-7: Typical Weave Facility



Freeway facilities are evaluated based on the density of vehicles. The higher the density, the slower the vehicles travel, and the worse the operations. Based on the vehicle density, the HCM provides LOS equivalents to represent the driver's perception of the facility operation. Table 6-4 contains the HCM freeway LOS.

Table 6-4: HCM Weaving Segments, Merge, and Diverge Facilities Level of Service

LOS	Density (passenger cars/mile/lane)	Description
A	Less than or equal to 10	Passing operation
B	>10-20	
C	>20-28	
D	>28-35	
E	>35	Unstable conditions
F	Demand Exceeds Capacity	Above capacity and unstable conditions

Source: TRB (2010)

All Interstate facilities were evaluated based on a PHF of 0.92 (ratio of the 60-minute volume divided by 4 times the highest 15-minute volume), the lowest accepted by VDOT's *Traffic Impact Analysis Regulations* to be consistent for all three sites and provide a conservative value for the analysis of future facilities (VDOT 2012). This is also the same PHF used to evaluate all intersection facilities within the study area.

6.6.7.2 Freeway Facilities Evaluated

The following facilities were evaluated:

AM Peak Hour Inbound Flows

- Weave Section: I-95/I-495 northbound between Kenilworth Avenue (MD 201) and Greenbelt Station Parkway/Greenbelt Metro Station
- Weave Section: I-95/I-495 southbound between U.S. Route 1 and Greenbelt Station Parkway/Greenbelt Metro Station

PM Peak Hour Inbound Flows

- Weave Section: I-95/I-495 northbound between Greenbelt Station Parkway and U.S. Route 1
- Weave Section: I-95/I-495 southbound between Greenbelt Station Parkway and Kenilworth Avenue (MD 201)
- Ramp Merge: I-95/I-495 northbound from Greenbelt Station Parkway/Greenbelt Metro Station **(No-build comparison due to failing Build Condition)**

<u>I-95/I-495 Northbound between Kenilworth Avenue (MD 201) and Greenbelt Station Parkway/Greenbelt Metro Station</u>

This facility is a five-lane facility along the freeway mainline with four through lanes and one lane serving the on- and -off ramps. There is a 2,785-foot distance between the on- and off- ramps and two maneuvering lanes (minimum number of lanes in use to either enter or exit the freeway).

<u>I-95/495 Southbound between U.S. Route 1 and Greenbelt Station Parkway/Greenbelt Metro Station</u>

This facility is a five-lane facility along the freeway mainline with four through lanes and one lane serving the on- and off-ramps. There is a 3,500-foot distance between the on- and off-ramps and two maneuvering lanes (minimum number of lanes in use to either enter or exit the freeway).

I-95/495 Northbound between Greenbelt Station Parkway/Greenbelt Metro Station and U.S. Route 1

This facility is a five-lane facility along the freeway mainline with four through lanes and one lane serving the on- and -off ramps. There is a 4,500-foot distance between the on- and off- ramps and two maneuvering lanes (minimum number of lanes in use to either enter or exit the freeway).

I-95/I-495 Southbound between Greenbelt Station Parkway/Greenbelt Metro Station and Kenilworth Avenue (MD 201)

This facility is a five-lane facility along the freeway mainline with four through lanes and one lane serving the on- and off-ramps. There is a 3,500-foot distance between the on- and off-ramps and two maneuvering lanes (minimum number of lanes in use to either enter or exit the freeway).

I-95/I-495 Northbound from Greenbelt Station Parkway/Greenbelt Metro Station (No-build Condition only as comparison to failing Build Condition weave facility)

This facility is a five-lane facility with four through lanes and one lane serving the on-ramp. There is a 1,000-foot deceleration lane serving the on-ramp. Based on the HCM (equation 12-4; TRB 2010) the vehicle volume entering, exiting, and remaining on the freeway determines the maximum distance for a facility to be considered a weave facility. Because the vehicle volume between Greenbelt Station Parkway/Greenbelt Metro Station and the downstream off-ramp to U.S. Route 1 result in weave distance shorter than the actual distance, this facility does not qualify to be analyzed as a weave facility and must be analyzed as a merge facility.

6.6.7.3 Freeway Analysis

Based on the analysis performed using HCS, two Interstate facilities are projected to fail. During the AM peak hour, the weave facility serving FBI vehicle trips from I-95 from the north to Greenbelt Station Parkway/Greenbelt Metro Station would result in a failing freeway facility (LOS F). During the PM peak hour, the weave facility serving FBI vehicle trips to I-95 to the north would result in a failing freeway facility (LOS E). Table 6-5 contains the Build with Mitigation Condition HCS freeway analysis.

Table 6-5: Build with Mitigation Condition Freeway Analysis

Freeway Analysis	Facility Type	Density (pc/mi/ln)	LOS	Check
I-95/I-495 Northbound between Kenilworth Avenue (MD 201) and Greenbelt Station Parkway/Greenbelt Metro Station (AM only)	Weave	30.7	D	**Pass**
I-95/I-495 Southbound between U.S. Route 1 and Greenbelt Station Parkway/Greenbelt Metro Station (AM only)	Weave	44.5	F	**Fail**
I-95/I-495 Northbound between Greenbelt Station Parkway/Greenbelt Metro Station and U.S. Route 1 (PM only)	Weave	38.0	E	**Fail**
I-95/I-495 Southbound between Greenbelt Station Parkway/Greenbelt Metro Station and Kenilworth Avenue (MD 201) (PM only)	Weave	32.8	D	**Pass**

Notes: LOS = Level of Service; Density = Passenger cars per mile per lane (pc/mi/ln)

If any of the Interstate facilities failed, an additional test was agreed based on the Greenbelt Site Transportation Agreement to determine if the difference in vehicle density between the No-build Condition and Build Condition was greater than 5 percent. This would confirm that the forecasted FBI vehicle trips significantly contributed to the

failing of the facilities. Based on the additional analysis, the failing Interstate facilities would contribute more than 5 percent to vehicle density, thus both facilities would be impacted by the addition of forecasted FBI vehicle trips. It should be noted that this analysis followed the Maryland SHA future planned designs for the I-95/I-495 corridor between U.S. Route 1 and Kenilworth Avenue (MD 201). Based on a conversation with Maryland SHA, the Maryland SHA analysis performed indicated that the facilities with failing LOS would be expected to fail in the future; however, the average speed through the corridor would be expected to be 30 mph and thus acceptable (Maryland SHA 2015b). Table 6-6 contains the Build with Mitigation Condition additional freeway analysis.

Table 6-6: Build with Mitigation Condition Freeway Analysis

Additional Freeway Analysis	Condition	Density (pc/mi/ln)	Density Difference	AM Check
I-95/I-495 Southbound between U.S. Route 1 and Greenbelt Station Parkway/Greenbelt Metro Station (AM only)	No-build	39.7	12.1%	**Fail**
	Build with Mitigation	44.5		
I-95/I-495 Northbound between Greenbelt Station Parkway/Greenbelt Metro Station and U.S. Route 1 (PM only)	No-build	29.0 [a]	31.0%	**Fail**
	Build with Mitigation	38.0		

[a] Represents a Merge Facility

Notes: Density = Passenger cars per mile per lane (pc/mi/ln)

6.6.8 Entry Control Facility Summary

The ECF analysis was performed once the complete set of external roadway mitigation was established. All mitigation measures were coded into TransModeler™, and the several scenarios were tested to determine the minimum number of lanes capable of handling the AM peak hour forecasted FBI vehicle trips. It was determined that three lanes at the Site South Access and three lanes at the Site Northwest Access were required to handle the forecasted demand. This resulted in the following breakdown of vehicles between the two ECFs:

- South Entrance from Frontier Drive Extension: 491 vehicles or 48 percent
- East Entrance from Metropolitan Center Drive: 530 vehicles or 52 percent

Following the process to ensure statistical accuracy for the simulations, TransModeler™ was used to run 25 simulations for each scenario to calculate the standard deviation based on the VHT metric. Appendix C10 contains the statistical results for determining the minimum number of TransModeler™ simulations required to be within plus or minus 2 percent at the 95th percentile confidence interval. Following the statistical procedure, the following three scenarios were completed:

- Site South Access and Greenbelt Station Parkway and Site Northwest Access and Greenbelt Station Parkway traffic signal controlled
  1. Two lanes at the Site South Access and two lanes at the Site Northwest Access
  2. Three lanes at the Site South Access and two lanes at the Site Northwest Access
  3. Three lanes at the Site South Access and three lanes at the Site Northwest Access

The first and third scenarios relied on the inbound FBI vehicle trip volume from each origin to the two ECFs calculated using the TransModeler™ DTA process. Because the distance between the two ECFs to the decision point is too short for vehicles to decide whether to use the Site South Access or Site Northwest Access, the DTA was unable to properly balance the FBI vehicle volumes between the two ECFs. Therefore, the second scenario required a manual adjustment to the inbound FBI vehicle trip volume to balance the volumes between the two

ECFs based on an imbalance in the number of lanes (three in the Site South Access and two in the Site Northwest Access). A total of 50 vehicles (30 from I-95/I-495 North and 20 from I-95/I-495 South) were shifted from the Site Northwest Access to the Site South Access to account for the higher capacity available at the Site South Access.

Based on the analysis, a minimum of three lanes for both ECFs would be required for the average queue length for all lanes exceeding the average available space for all lanes. The second scenario was close, but the average queue length for all lanes still exceeded the average capacity by 17 feet for the Site South Access and 12 feet for the Site Northwest Access. Two lanes for both ECFs resulted in substantial queues for both facilities. Table 6-7 contains the ECF results.

Table 6-7: ECF Results

Entrance	Lanes	Two and Two Lanes					Three and Two Lanes					Three and Three Lanes				
		Vehicles Processed	Proposed Length	Average Queue	Maximum Queue	Pass/Fail	Vehicles Processed	Proposed Length	Average Queue	Maximum Queue	Pass/Fail	Vehicles Processed	Proposed Length	Average Queue	Maximum Queue	Pass/Fail
		Vehicles	Feet				Vehicles	Feet				Vehicles	Feet			
Site South Access	1	218	295	285	1,155	Fail	203	295	129	388	Fail	152	295	64	208	Pass
	2	217	305	352	2,043	Fail	211	305	131	291	Pass	187	305	74	181	Pass
	3						211	315	132	272	Pass	194	315	81	193	Pass
	Average		**300**		**1,599**	Fail		**300**		**317**	Fail		**300**		**194**	Pass
Site Northwest Access	1	209	480	334	754	Fail	211	480	231	575	Fail	157	480	69	199	Pass
	2	217	495	361	849	Fail	212	495	213	423	Pass	175	170	77	207	Pass
	3											200	495	118	266	Pass
	Average		**488**		**802**	Fail		**488**		**499**	Fail		**382**		**224**	

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6.6.9 Signal Warrant Analysis Summary

A signal warrant analysis is a quantitative assessment based on traffic volumes and established standards to determine whether or not installing a traffic signal at a specific intersection is justified or warranted. A signal warrant analysis was conducted following the guidelines from the *2009 Manual on Uniform Traffic Control Devices* (MUTCD) (FHWA 2012). To be consistent for all three proposed alternative sites, the Virginia Supplement to the 2009 MUTCD, 2011 Edition guidelines were also employed (VDOT 2011). Combining both methods provides an analysis of two signal warrants per intersection: an average daily traffic (ADT) warrant and a peak hour warrant.

The ADT warrant (following the Virginia guidelines) compares a forecasted ADT volume for the intersection to minimum established ADTs based on the number of lanes along the two intersecting roadways. The forecasted intersection ADT is calculated by applying a 10 percent factor to the AM peak hour forecasted volumes (highest left-turn volume). The volumes are then compared to several tables in the VDOT MUTCD Supplement. The first table in the VDOT MUTCD Supplement contains the urban area minimum vehicle volumes to qualify the intersection; the second table in the VDOT MUTCD Supplement contains the urban area interruption of continuous traffic vehicle volumes to qualify the intersection. Both tables also contain 80th percentile volumes for both cases, which is used in urban areas. Based on the ADT warrant analysis, the Greenbelt Metro Drive and Site North Access that could benefit from a traffic signal would not meet all the ADT warrants. Table 6-8 contains the ADT warrant summary.

Table 6-8: ADT Warrant Analysis

Warrant	Forecasted ADT	Warrant Minimum Limit	Warrant Check
Greenbelt Metro Drive and Site North Access			
Warrant 1A – Minimum Vehicular Volume	14,980	8,000	**Meets**
Warrant 1B – Interruption of Continuous Traffic	14,980	12,000	**Meets**
Warrant 1C – Combination of 1A and 1B (80%)	14,980	6,400	**Meets**
	14,980	9,600	**Meets**

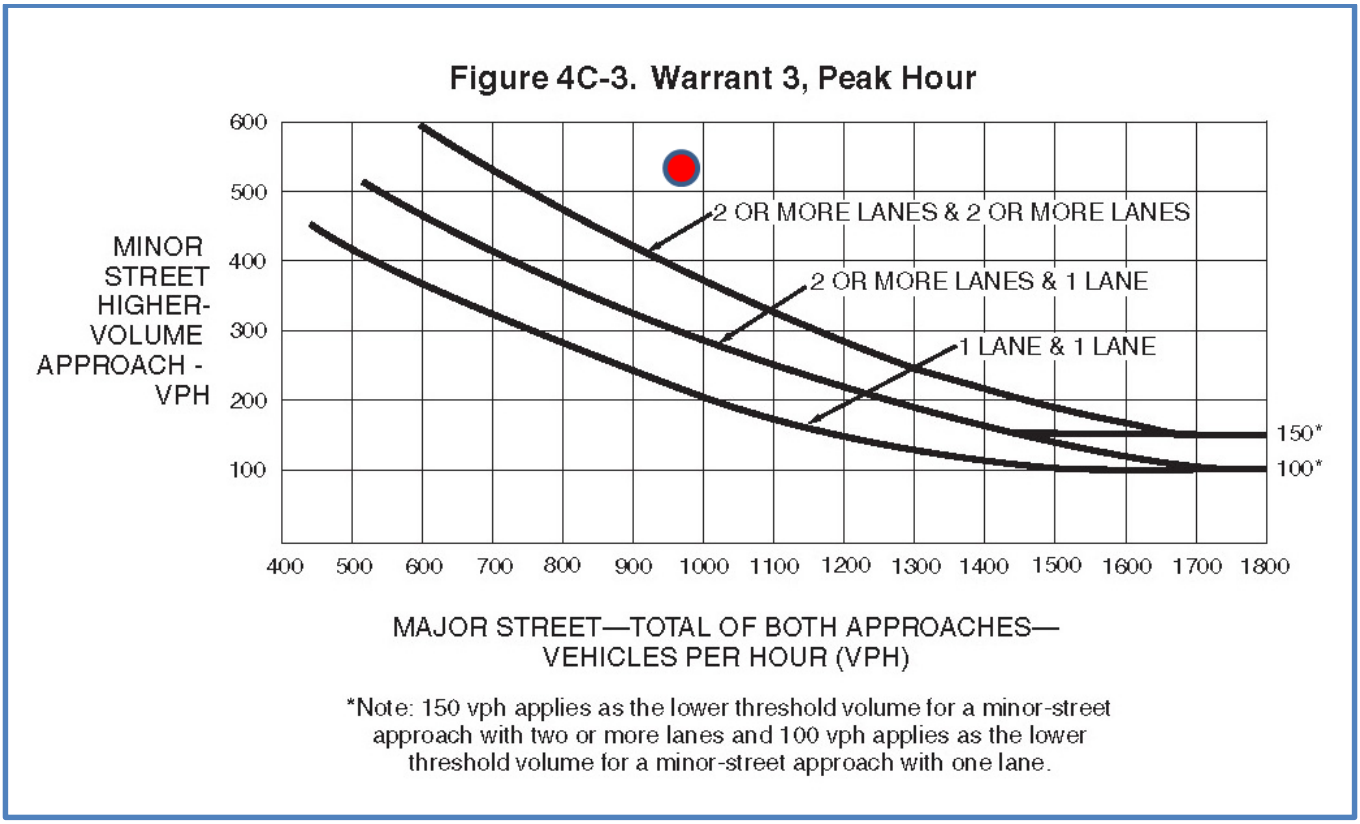
The peak hour warrant following the MUTCD requires two categorical tests. If either of the categorical tests passes, then the intersection meets the warrant. The first category includes three tests: a test of the intersection delay under STOP-sign control, a test of the minor street vehicle volume, and a test of the total intersection volume. The intersection delay test determines if the intersection is under a STOP-control, the delay for the minor-street would exceed five vehicle-hours (number of vehicles in queue times approach vehicle delay) for two lanes. The minor street vehicle volume test determines whether or not the vehicle volume exceeds 150 vehicles for two lanes. The third test of the total intersection volume examines if the total volume entering the intersection exceeds 650 vehicles for a three lane approach. The second categorical test includes one test based on a plotted chart published in the MUTCD (figure 4C-3; FHWA 2012). The chart plots the highest minor street approach volume against the total major street approach volumes. If the plotted point for the highest minor street approach falls higher than the appropriate curve (based on number of lanes for the major and minor approaches), the peak hour warrant is met.

Based on the peak hour warrant analysis, the intersection would meet the warrant. The intersection meets all parts of the peak hour warrant except for the total stopping time; however, as long as the intersection meets the second category, the warrant is met. Table 6-9 contains the peak hour warrant analysis results. Figure 6-8 shows the MUTCD plotted graph with the intersection point plotted.

Table 6-9: Peak Hour Warrant Analysis

Warrant	Forecasted Values	Warrant Minimum Limit	Category Check	Overall Check
Greenbelt Metro Drive and Site North Access				
Warrant 3A1 – Total Stopping Time	2.5 hours	4 hours	**Fails**	
Warrant 3A2 – Minor Street Volume	522 vehicles	150 vehicles	**Meets**	
Warrant 3A3 – Total Entering Volume	1,498 vehicles	650 vehicles	**Meets**	
Warrant 3B – Plotted Point on Curve	See figure 6-8		**Meets**	**Meets**

Figure 6-8: MUTCD Warrant 3B - Peak Hour Warrant with Intersection Point Plotted



6.7 Overall Summary

The following summarizes the conclusions of the transportation evaluation:

A total of 3,296 AM peak hour and 3,047 PM peak hour person trips are projected to be added to all modes of transportation. Total Metro transit trips are projected to be 1,742 trips in the AM peak hour and 1,610 trips in the PM peak hour. Total vehicle trips are projected to be 1,100 trips in the AM peak hour and 1,016 trips in the PM peak hour. The remaining trips would be commuter rail, bicycle, or walking trips.

The pedestrian network would expand under the No-build Condition with the inclusion of Greenbelt Station Parkway providing a new connection between the Greenbelt Metro Station and Greenbelt Road serving North and South Core developments. The inclusion of the Greenbelt site would allow for the same connections as the No-build Condition. It is assumed that all sidewalk curb ramps located adjacent to the parcel would be constructed to ADA compliance.

The bicycle network would expand with the inclusion of Greenbelt Station Parkway providing a new connection between the Greenbelt Metro Station and Greenbelt Road serving the North and South Core developments. The inclusion of the Greenbelt site would not change the bicycle connections. These new connections would provide for an interconnected bicycle network linking all proposed bicycle facilities in the study area and would encourage bicycle use to access to the Greenbelt site.

The transit network (Metrorail and Metrobus) would not be affected by the Greenbelt Site. The Greenbelt Metro Station and all bus service would operate below capacity with the addition of the forecasted background growth and transit trips. It is assumed that WMATA would follow their long-term plan to address growth-related capacity issues for both bus and rail operations.

Parking availability would remain the same because the Greenbelt site would accommodate all parking needs onsite and implement a robust Transportation Management Plan to discourage employees from seeking alternative parking options in the nearby neighborhoods.

Truck access would be designed to accommodate the Greenbelt site from the Greenbelt Station Parkway site south access. This plan is not the official plan, but a plan to evaluate as part of the EIS. The Greenbelt Station Parkway site south access would operate as a truck only access point during off-peak hours because it would be assumed that all truck deliveries would be scheduled during the off-peak hours.

The traffic operations at two intersections (Edmonson Road at Powder Mill Road and Kenilworth Avenue at I-95/I-495 Southbound off-ramp) currently operates at an unacceptable level of service under the Existing Condition. Once the background growth, planned developments, and planned improvements are added (No-build Condition), the same intersection would continue to fail. There are a number of planned roadway improvements within the Springfield site study area to compensate for the vehicle trips added from the background growth.

The addition of the Greenbelt site to the traffic network would result in three intersections operating at an unacceptable level of service. These three failing intersections would experience equal or better operations than the No-build Condition as a result of recommended mitigation that include new turning lanes, extended turning lane lengths, and new travel lanes. Overall, the roadway non-Interstate network would operate much better and experience shorter queues with the addition of the recommended mitigation when compared to the No-build Condition.

There are forecasted to be two failing Interstate facilities that directly serve access between the Capital Beltway and the Greenbelt site. The Maryland SHA is working to determine the best course of action to address these issues. It is assumed, at a minimum, there will be required changes to the Interstate ramps along the Capital Beltway between the U.S. Route 1 and Baltimore Washington Memorial Parkway Interchanges.

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8.0 Acronyms and Abbreviations

A

AADT	Annual average daily traffic
ADA	Americans with Disabilities Act
ADT	Average daily traffic
ATR	Automated Traffic Recorder
AWSC	All-way STOP-Controlled

C

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLV	Critical Lane Volume
CMRT	Central Maryland Regional Transit
CUP	Central Utility Plant

D

DDOT	District Department of Transportation
DOT	Department of Transportation
DTA	dynamic traffic assignment

E

ECF	Entry Control Facility
EIS	Environmental Impact Statement

F

FBI	Federal Bureau of Investigation
FHWA	Federal Highway Administration

G

GIS	Geographic Information Systems
GSA	General Services Administration
GSF	Gross Square Feet

H

HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HQ	Headquarters

I

ISC	Interagency Security Committee
ITE	Institute of Transportation Engineers

J

JEH	J. Edgar Hoover

L

LOS	Level of Service

M

MARC	Maryland Area Regional Commuter
MEV	million entering vehicles
M-NCPPC	Maryland National Capital Park and Planning Commission
mph	miles per hour
Maryland SHA	State Highway Administration
MTA	Maryland Transit Administration
MUTCD	Manual on Uniform Traffic Control Devices
MWCOG	Metropolitan Washington Council of Governments

N

NCHRP	National Cooperative Highway Research Program
NCPC	National Capital Planning Commission
NCR	National Capital Region
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association

O

OPO Old Post Office

P

PHF peak hour factor

R

RDF Remote Delivery Facility

RFDS Reasonably Foreseeable Development Scenario

S

SDDCTEA Surface Deployment and Distribution Command Transportation Engineering Agency

SF Square Foot

SMA Sectional Map Amendment

SOV Single Occupant Vehicle

T

TAZ Transportation Analysis Zone

TDM Travel Demand Management

TIA Transportation Impact Assessment

TIP Transportation Improvement Program

TMP Transportation Management Plan

TRB Transportation Research Board

TWSC Two-way STOP-Controlled

U

UMD University of Maryland

U.S. United States

USDA U.S. Department of Agriculture

USDOJ U.S. Department of Justice

V

v/c volume-to-capacity ratio

VC Visitor Center

VDOT Virginia Department of Transportation

VHT Vehicle hours of travel

W

WMATA Washington Metropolitan Area Transit Authority